THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIX. No. 730.] LONDON, MAY 8, 1877. [29TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal; 28-candle gas; coke, 66·70 per cent.; volatile matters, 33·30 per cent. Coke of good quality.

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These Paints are now used in 150 Country Gas-Works, and by all the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

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J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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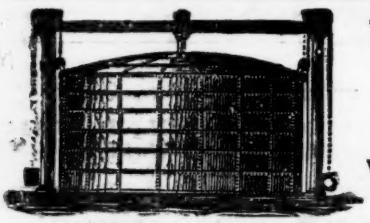

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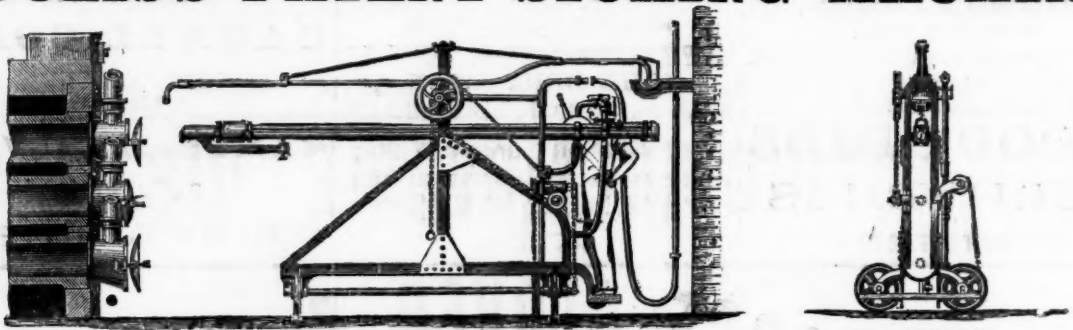

SIDE ELEVATION OF DRAWING MACHINE. END ELEVATION.

(The Charging Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz:
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SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 800 days, and are yet in good order. References on application.

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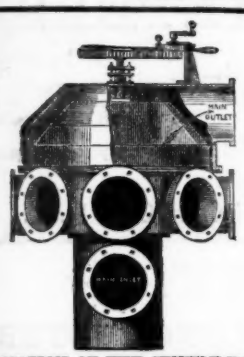
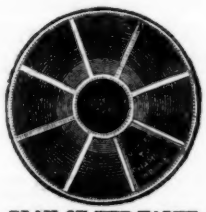
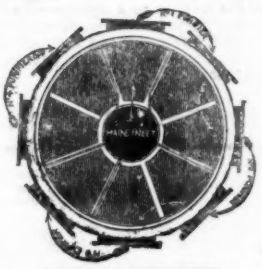
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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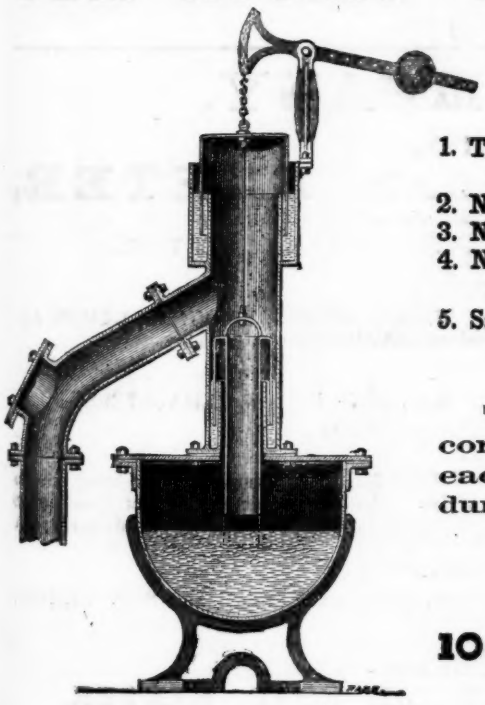
SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

These Dip-Pipes can now be supplied complete, except the flanched bend, for £4 each, which includes the charge for licence during the whole term of the patent.

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Who fix the Dip-Pipes, at a small Charge, when required.

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Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

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FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

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ALL METERS ARE UPHELD FOR FIVE YEARS.

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NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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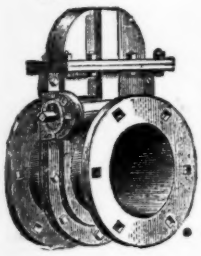
LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

B. DONKIN & CO.'S

IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS.



List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.

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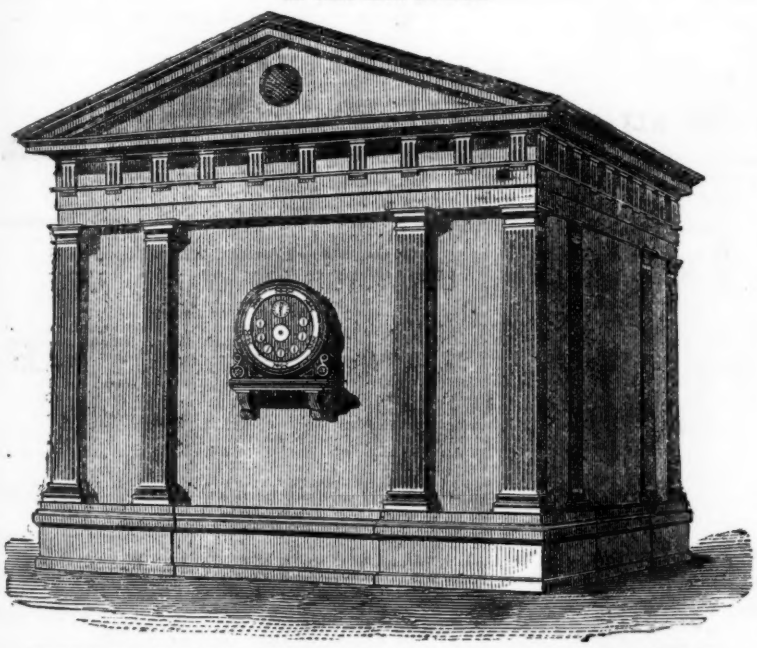

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GAS-RETORTS, GLASS-HOUSE FURNACE,
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And Every Description of Best Fire-Bricks.

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Of all Dimensions for Gas-Works,
GLASS-HOUSE POTS & CRUCIBLES
Of every kind.
The Highest Award was obtained by H. & M., at the Philadelphia Exhibition, 1876, for Superior Quality of Manufacture.

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PREVENTS WASTE OF GAS FROM RETORTS;
SAVES CLAY RETORTS FROM DESTRUCTION BY FIRE;
GREATLY ECONOMIZES THE USE OF FIRE-BRICKS;
And PREVENTS ALL POSSIBLE LOSS of GAS FROM LEAKAGE.
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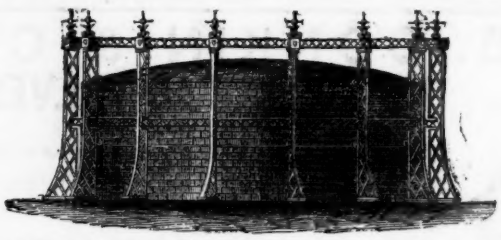
THE GAS CEMENT WORKS,
BIRKENHEAD.

GAS AND WATER PIPES.
WILLIAM MACLEOD & CO.,
18 & 20, ALSTON STREET, GLASGOW.
CAST-IRON GAS AND WATER PIPES.

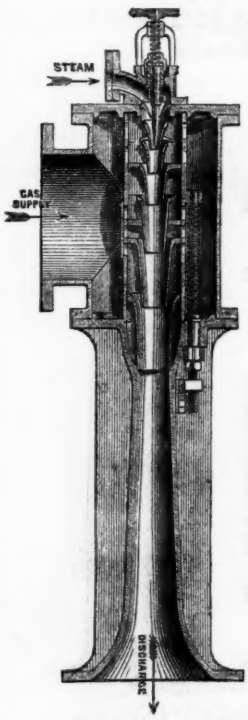
DELIVERY F.O.B. ON CLYDE, OR STOCKTON-ON-TEES.
Prices on application.

ALFRED WILLIAMS,
PHŒNIX FIRE-BRICK WHARF,
64, BANKSIDE, SOUTHWARK, LONDON, S.E.
GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.



THE HORSELEY COMPANY,
LIMITED,
TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

KÖRTING BROS.,
Steam-Jet Engineers,
7 and 17, LANCASTER AVENUE,
MANCHESTER,
AND 40, LOWER GARDINER STREET, DUBLIN.

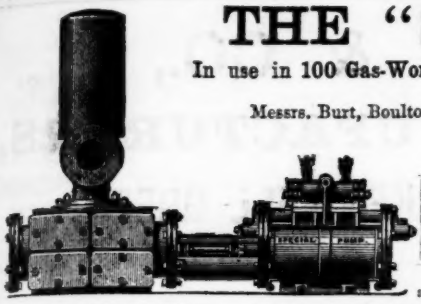


E. KÖRTING'S PATENT
STEAM-JET GAS-EXHAUSTER.
IMPROVED CLELAND'S PATENT.
Small Cost—Compactness—Perfectly Self-Acting—Self-Regulating—Self-Cleansing—No Steam-Engine—No Attention—No Extra Room Required—No Wear and Tear—No Noise—No Oscillation in Vacuum, or Back Pressure.
UPWARDS OF 200 IN USE.
SUPPLIED TO—

Chartered Gas Co.	Glasgow Corporation.	Hanna, Donald, and Wilson, London.
London Gas Co.	Leyland Gas Co.	Ratcliff Gas-Works.
S. Metropolitan Gas Co.	Stalybridge Gas-Works.	Kendal Gas-Works.
Phœnix Gas Co.	Lincoln Gas-Works.	Longton Gas Co.
Liverpool Gas Co.	Birmingham Gas-Works.	Dartford Gas Co.
Bolton Corporation.	Wakefield Gas-Works.	Exeter Gas Co.
Horsham Gas Co.	Brentford Gas-Works.	Harrogate Gas Co.
Epsom and Ewell Gas Co.	Burnley Gas-Works.	Hertford Gas Co.
Ipswich Gas Co.	Guildford Gas-Works.	Waterside Gas-Works, Todmorden.
Cheltenham Gas Co.	Gloucester Gas-Works.	F. W. Grafton and Co., Accrington.
Sandwich Gas Co.	Kirkintilloch Gas-Wks.	
Cornholme Dis. Gas-Wks.	Nantwich Gas-Works.	
Bury Gas-Works.	Enniskillen Gas-Works.	
	&c., &c., &c.	

E. KÖRTING'S PATENT STEAM-JET REVIVIFYING BLOWERS FOR THE PURIFYING MATERIAL.
SOLE LICENSEES FOR
W. CLELAND'S PATENT STEAM SCRUBBER AND SLOW-SPEED CONDENSER.
FOR PARTICULARS, APPLY TO
KÖRTING BROS., 7 and 17, Lancaster Avenue,
MANCHESTER,
and 40, Lower Gardiner Street, Dublin,
OR TO
GERALD J. TUPP, 8, John Street, Adelphi, W.C.,
LONDON,
SOLE AGENT FOR ENGLAND AND WALES.

THE "SPECIAL" STEAM-PUMP.



In use in 100 Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

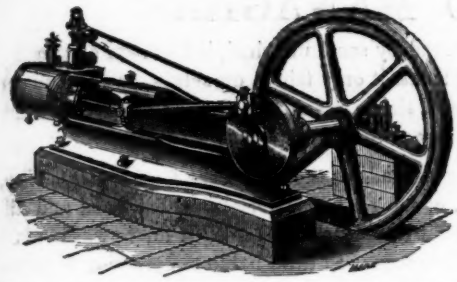
Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

200 Sizes made. The following are the Leading Sizes for Gas-Works:—

Steam Cylinder . . .in.	3	4	3	5*	5*	4	6*	5	7*	6	8*	7	10*
Water Cylinder . . .in.	1½	2	3	2¼	3	4	4	5	5	6	6	7	7
Gallons per hour . . .	450	815	1830	1250	1830	3250	3250	5070	5070	7330	7330	9750	9750
Price	£16	£18	£18	£21	£22½	£25	£30	£32½	£40	£40	£50	£50	£65

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

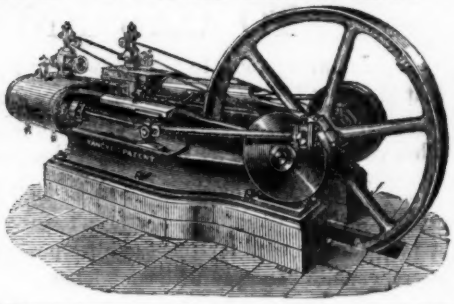
TANGYE'S HORIZONTAL HIGH-PRESSURE STEAM-ENGINES.



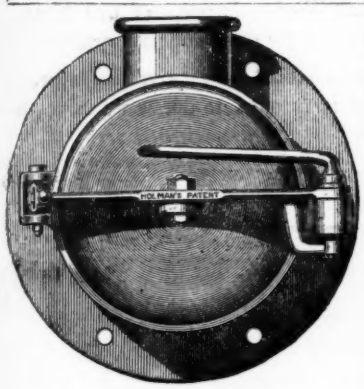
THE DESIGN, WORKMANSHIP, AND LOW PRICE OF THESE ENGINES HAVE CALLED FORTH UNIVERSAL APPROVAL.

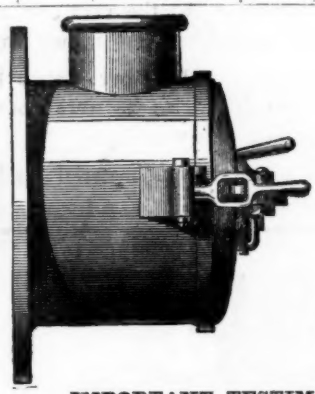
Over 2000 Sold

Since December, 1869.



SIZE	B	C	D	E	G	H	I	J	K	M
Nominal Horse Power	TWO	THREE	FOUR	SIX	EIGHT	TEN	TWELVE	FOURTEEN	EIGHTEEN	TWENTY-FIVE
Price of Engine, with Governor	£28 0	£38 0	£46 0	£70 0	£90 0	£115 0	£127 0	£140 0	£195 0	£220 0
Feed-Pump, extra.	3 0	3 15	4 0	5 10	6 0	7 10	7 10	8 0	10 0	15 0
Variable Expansion Gear, extra	..	..	..	..	13 0	14 0	15 0	15 0	20 0	25 0





MORTON'S
Patent Self-Sealing
RETORT LIDS,

WITH

HOLMAN'S NEW PATENT BRACKETED CROSS-BARS, ANTI-FRICTION CATCHES, AND ECCENTRIC FASTENINGS.

Instantaneous Sealing effected. No Luting. No Duplicate Lids required. Holman's New Self-Sustaining Cross-Bar ensures freedom of joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), nearly 25,000 being in use at various Gas-Works in London and the Provinces.

IMPORTANT TESTIMONIAL.

The Gaslight and Coke Company (commonly called the Chartered Gas Company), Beckton, North Woolwich.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them. I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly, (Signed) G. C. TREWEY.

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

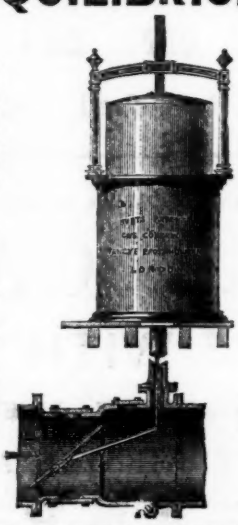
Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dronfield, Dursley, Exeter, Guernsey, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION TO

TANGYE BROTHERS & HOLMAN,

SOLE MANUFACTURERS,

LAURENCE POUNTNEY LANE, LONDON, E.C.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

TO GAS ENGINEERS AND MANAGERS.

It having come to our knowledge that a report is in circulation, spread by some unprincipled person or persons, that the cases of our larger-sized Meters are made of Galvanized Iron, we think it only fair to ourselves, and just to our customers, to say, that we never have used, in making any of our Meters, a single pound of *Galvanized Iron*, or any other *cheap* and *inferior material*, and this can be easily seen by opening any of them.

The cases of our large-sized Meters, from 20 lights and upwards, are all made of the very *Best Best Patent Alloy*, which is nearly double the price, and will last more than double the time, of some other material that has been and still is very largely used for the same purpose. And our experience, acquired by an extensive use of it for upwards of 30 years, enables us to say with confidence that no other metal in use for the purpose is so little liable to corrosion from the action of the gas.

We have now in use a Meter made in 1848, and therefore 29 years old, the case of which is made of Patent Alloy; the Meter is still in perfect order, and shows no signs of decay.

The utmost care is exercised by us in selecting none but the very best materials for all parts of our Meters; much of it is made *expressly for us*, as it is not possible to obtain it in the open market of the same superior quality.

The great fall in the price of all materials used in making our Meters has enabled us to give an increased discount, thus giving our customers the benefit of the fall. This we were bound in fairness to do, as we raised the price of our Meters four years ago, when the price of all metals went up.

It will be our constant endeavour, by using none but the best materials, and employing the most skilful workmen, to maintain the high character our Meter has hitherto borne.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 8, 1877.

Circular to Gas Companies.

The Crystal Palace District Gas Company have been unsuccessful with the Bill they promoted to get rid of the obligation to keep the amount of sulphur impurity in their gas below twenty grains per hundred cubic feet. We gave in our last "Circular" a conjectural outline of the case which would be presented by the promoters and answered by the opponents of the measure; and, in future numbers, we shall give in detail the evidence adduced on both sides. Briefly speaking, it embraced the points we mentioned, the object of the Company being to show that no practical means exist of purifying gas from the known "sulphur impurities, other than sulphuretted hydrogen," which could be employed without producing offence, while some identified sulphur compounds can be demonstrated to be present in gas, which utterly defy removal by any process yet discovered. It was further sought to show that the damage alleged to be caused to health and property by sulphur in gas, if real, might be attributed to other causes. On the other hand, the opposing Local Authorities sought to prove that practical means of purification were known, and that the damage done to property was real, and was undoubtedly occasioned by the production of sulphuric acid during the combustion of gas containing sulphur compounds.

At this moment it would be inopportune to make any comments on the evidence brought forward. Under present arrangements, the consideration of the Bill promoted by The Gaslight and Coke Company, with an object similar to that above mentioned, stands adjourned until to-morrow. Although, as we have said, the objects of the two Bills are identical, the circumstances of the two Companies are very dissimilar. If, then, the Chartered Company decide to proceed with their Bill, it is understood that while the evidence given in the previous case will be accepted by both parties, much additional testimony will be adduced, with a view to strengthen the case of both promoters and opponents.

We ought to have said that at the onset it was proposed that the decision of the Committee should be reserved until the evidence on the two Bills had been heard. The Committee, however, determined that each should stand on its own merits. It cannot be disguised, that the decision of the Committee in the case of the Crystal Palace District Company causes apprehension as to the possible success of the Chartered Company's Bill; yet, as we have said, the circumstances of the two Companies are in many respects so different, that the last named may very properly urge their claims for a special consideration of their case. It is, no doubt, an anxious time for the Directors and their counsellors, who have to decide on the advisability or not of proceeding with their Bill, and we must leave them to their own deliberations.

Somewhat contrary to our expectation, the Local Authorities who have promoted Bills in the present session, to confiscate gas undertakings, are not meeting with much success. We were told last year—and, to say the truth, we, to some extent, believed it—that the days for Gas Companies had vanished, and that gas undertakings were about to pass into the hands of Corporations and Local Boards. Parliament, however, hesitates to sanction the transfers by compulsion, and Companies opposing purchase clauses in the Bills of Authorities have been in every case successful. The instance of the Blackburn Bill may be quoted against us; but it must be remembered that in this case, although the clauses empowering the Corporation to purchase are retained in the Bill, the Gas Company are virtually left to set their own value on the undertaking. The terms, we understand, have been arranged. The Corporation, under the advice of Mr. G. W. Stevenson, have agreed to pay annuities equal to maximum dividends on the subscribed capital, with a bonus on all classes of shares, the full particulars of which we shall give next week. The Ashton-under-Lyne Improvement Bill, as we mentioned last week, has passed, but with the purchase clauses struck out. The Gas Company, by the success of their Bill, obtained all they desired, and more, we might say, for they have, of course, auction clauses and the sliding scale inflicted upon them. The confiscating Gas Bill of the Hanley Corporation was, last week, promptly rejected by a Committee of the House of Commons, and the British Company are left to continue their prosperous career at Hanley without fear of molestation, at all events for many years to come. Perhaps, however, the greatest success achieved this session has been that of the Londonderry Gas Company, in the House of Lords. In this case the Corporation of Londonderry endeavoured to obtain power to make a compulsory purchase, but it was disallowed by the Lords Committee. In the accounts presented by the Company in support of their Bill, it was shown that, during the forty-five years of their existence, they had expended on works, out of profits, £12,000; and the whole of this sum was allowed as original capital entitled to 10 per cent., making the total original capital of the Company £36,000. They have also obtained power to raise additional capital to the amount of £24,000, with borrowing power to the extent of one-fourth of the total capital, the Company having at present no mortgage debt. Auction clauses and the sliding scale have, of course, been inflicted, although we are credibly informed that Earl Redesdale entertains precisely the objections we do to these provisions. The sliding scale, however, is not likely to operate to the prejudice of the shareholders, for the standard price of 5s. 9d. has been granted. At the present moment the Company are supplying gas for 5s. per 1000 feet, so there can be no immediate fear of a disastrous operation of the sliding scale.

Gas and water affairs at Ramsgate may now be considered as settled—that is, in Parliament. We mentioned last week that an agreement had been come to between the Companies and the Local Board, for the sale and purchase of the undertakings, on the terms we stated. The revived Bill of the Ramsgate Board, embodying the terms, and asking powers to borrow, has been reported by the Committee of the Commons, and the seal of the Local Board has—not, however, without opposition—been affixed to the agreement. The Bill of the Thanet Gas Company has also been reported, with amendments necessary to fit it to its altered limits. It now relates to only the Margate portion of the undertaking; for the Corporation of Margate lost their chance of effecting a purchase when the Ramsgate Board made terms with the Company. It will be remembered that the Company, in respect of the two undertakings, asked for power to convert £48,000 of expended profits into improvement stock; of this the Committee have allowed £16,000 to be charged to the Margate undertaking, and have limited the dividend on it to five per cent. The new capital is, of course, to be disposed of by auction, and the sliding scale of dividend is imposed. The

standard price has been fixed at 4s. 2d. per 1000 feet, and it is, in our opinion, too low. The Company should have stood out for, at least, 4s. 6d. It cannot be said that Margate is more favourably situated for gas-making than other towns which have been granted a higher price. The Company should strive to get the price amended in the House of Lords.

The day so anxiously expected by those who, not having a penny invested in a gas undertaking, regard with envy every farthing of profit made by a Gas Company, and that feared by those who object to the acquisition of gas undertakings on the ground that gas is likely to be superseded by some other means of illumination, is reported to be dawning. Electricity, it has constantly been said, is the force which will generate the light of the future, and now a Northern Light has appeared, which many believe will fulfil the prophecy. A Russian electrician, M. Jablochskoff, of St. Petersburg, has invented what is called an "electric candle," of which vague information reached us long ago. The invention has been exhibited in Paris, and will presently, we are told, be shown in London; and now we have details, incomplete enough, as to the nature of the invention. It would appear that M. Jablochskoff has succeeded in subdividing an electric current; that is to say, from what we may call an electric trunk main, he can carry off "services" to generate light at various points. The interest and value of this invention or discovery we are not at all disposed to underrate; but, at the same time, we must caution gas proprietors against attaching the importance to it which panic-mongers desire. It is now many years since Liebig demonstrated that electricity, generated by acid and metal batteries, could never compete, in point of economy, with the ordinary illuminants—American petroleum being then undiscovered. That opinion undoubtedly holds good to-day. But, since the publication of the "Familiar Letters," vast strides have been made in electric science. We have now the powerful magneto-electric machines of Wilde, of Holmes, and of another more recent inventor, whose name has, for the moment, escaped us. Either one of these ponderous machines, rotated by the force of a four or six-horse power steam-engine, will develop sufficient electricity to furnish such a light as may be seen, if we remember rightly, at the lighthouse at the North Foreland, and two or three other lighthouses round our coasts. What we wish now to learn is, how many "electric candles" one of these machines will supply. We read in the daily papers of the electricity furnished by an "ordinary machine;" but at present we are left in ignorance of what this expression means. It can only mean one of those we have mentioned, or one similar, invented by M. Jablochskoff.

With the information before us, we are disposed to concede that the invention may be applied to the lighting of large halls and theatres; but at what cost we cannot at present say. To the strongholds of Gas Companies, however—shops and dwelling-houses—we regard the invention as utterly impracticable. When it is mentioned that every "electric candle" must be furnished with two perfectly insulated "service" wires, which will have to be carried all about a building, the difficulty of the installation (without having regard to the expense) will, we believe, be enormous. Then comes the cost of the "ordinary "machine," and the power to work it. Altogether, we cannot regard this invention, which, as it is put before us, is undoubtedly the most advanced step in electric illumination, as at all inimical to the interests of Gas Companies. We shall look forward with much interest to the experiment which it is reported is about to be made at the East India Docks, and shall endeavour to acquire all the information respecting the invention. In the meantime, we hope that no gas proprietor will be beguiled into selling his shares. Gas has still, we believe, a "long day." It will last our time.

We have now in the Metropolis a deputation from the Municipal Council of Paris, who, among other novelties, were invited to see, at the Baker Street Station, the manufacture of gas from shale oil, for illuminating railway carriages. It is the invention of Messrs. Pintsch and Co., of Berlin, and would have been mentioned to our readers earlier, but that we waited for details, which have not yet been supplied. The process may, however, be described in a very few words. Shale oil—Young's paraffin, we believe, was used when we saw the apparatus—is made to trickle slowly over the inclined floor of an iron retort, heated to moderate redness, on to the floor of another, heated more strongly. In this way about one third of the oil is converted partly into permanent gas, and partly into vapour, which are carried away to a gasholder. From this it is pumped into a large iron cylinder, in which it is subjected to a pressure of about six atmospheres. Every carriage to be lighted carries underneath it a similar cylinder of smaller dimensions, which is filled from the large stationary cylinder at, of course, nearly an equal pressure. From this the burners in the roof of the carriage are supplied by means of suitable apparatus. The gas made has, at the ordinary test rate of consumption (five feet per hour), the illuminating power of more than forty candles, and costs, we believe, about 16s. per 1000 feet. When this is burnt at the rate of half a foot per hour, it is necessarily cheaper than common coal gas burnt at the rate of three feet per hour, and costing 3s. 6d. per 1000 feet. As regards the relative luminiferous value of the two lights, we must leave our readers to form their own opinion. They may travel on the Metropolitan line, lighted with coal gas, and, changing at Baker Street, get into a carriage on the St. John's Wood line, lighted with the oil gas, consumed at the rate we have mentioned, and may judge for themselves. The special recommendation claimed is the fact that a carriage, with a cylinder filled with the compressed gas in London, may travel hence to Aberdeen and return, without any necessity for replenishing the cylinder. We have a description and drawings of the apparatus of this or of a very similar invention in use on an American railway, which we may shortly lay before our readers.

The Corporation of Birmingham have justifiably, and even wisely, taken to dealing in gas-fittings. They do not manufacture, but buy in the open market, and retail to their gas customers. It is natural that their articles, stamped with a sort of Corporation guarantee of excellence, should command a sale. It is also natural that the proceedings of the Gas Committee should excite the ire of manufacturers from whom they do not buy. Unhappily, political feeling runs high in the Birmingham Town Council, and thus it happened that at a recent public meeting a Councillor and J.P. took the opportunity of making a disgraceful attack on the Gas Committee, whom he accused of jobbery and corruption in connexion with their trade in gas-fittings. The attack was altogether undeserved, and we think the Committee could have afforded to treat the slander with contempt. They have, however, taken it seriously to heart, and, failing to obtain an apology from the rancorous J.P., they have resolved on calling the attention of the Lord Chancellor to his conduct. With this little interlude, the gas business of the Corporation is progressing most satisfactorily. During the quarter ending the 31st of March last, 867 new services were supplied, being an excess of 337 over the number supplied in the corresponding quarter of 1876. The average illuminating power of the gas supplied, according to official testings, during the quarter, was 17·30 candles.

It is not without amusement that we learn that the advice we have several times given to our North British friends, to reduce the quality of their gas, is interpreted as part of a deep design to procure a reduction in the price of Scottish cannel, for the advantage of English Gas Companies. It is hardly necessary to say that no idea of the sort ever entered into our head. Our Scottish friends are welcome to their twenty-eight candle gas as long as the material which will furnish it lasts. That may not be very long, and soon a descent, we imagine, will be made to twenty-three or twenty-five candles, at which the standard may remain for many years. The process of Messrs. Aitken and Young, a report on which we shall publish next week, will perhaps prolong the days of rich gas; but as the gas is enriched at the expense of the tar, which thereby loses something of its commercial value, we fancy the cost of the gas must be somewhat increased.

Water and Sanitary Notes.

ANOTHER Conference on the Health and Sewage of Towns has been held under the auspices of the Society of Arts, and it has been well attended. If no great good is to be expected from these meetings, which give various gentlemen the opportunity of dilating on their crotchets, and, in some cases, of puffing their inventions, at all events no harm is done. Most people who attend these meetings go there possessed of fixed ideas, and nothing they hear at all affects their opinions. The hour and the man have yet to arrive, at which and by whom the "sewage "difficulty" will be solved, and perfected sanitary arrangements make the lifetime of an average Englishman equal that of Old Parr. Meanwhile, we shall have to listen to such "distracting utterances" as are evoked by the praiseworthy efforts of the Society of Arts to encourage invention, and disseminate information. Our special thanks are due to the Society for liberally furnishing printed copies of the papers to be read at the Conference. A glance over these papers shows them to be of very unequal value, some being of much interest, some of very little, and one, at least, being distinctly foolish. Nevertheless, we recommend all our readers interested in the sewage question to become possessed of this book, for it opens with a summary of returns furnished to the Society by various

towns, showing the mode in which sewage is dealt with in the several localities, the cost and other particulars, to which the population and death-rate have been added. One other item of information should have been given—namely, the density of the population; for, in our opinion, other things being equal, the death-rate of a community varies with the space into which the individuals composing it are compressed. All such returns are, of course, more or less misleading; but this, to our minds, bears evidence of being compiled with more than usual care. In connexion with the Conference, there was a small Exhibition of Sanitary Appliances, and some inventions displayed therein we would notice, but for the fact that our limited space is just now so much occupied with parliamentary proceedings.

We have already mentioned that the undertaking of the Ramsgate Water Company has been disposed of to the Local Board for £70,000. Only a small profit is expected by the Board for a few years; but there can be no doubt that, in the course of time, the concern may, if the Board are disposed, be made very profitable. It is, however, a question whether a Local Authority should work a water undertaking so as to make a profit. We have always urged that a gas undertaking, in the hands of an authority, should only be made self-supporting, and much more might be said in support of our argument in connexion with a water undertaking.

The water accounts of the Corporation of Salford show that, at the commencement of the year ending June 30, 1876, the revenue account was credited with a balance to the bad of £3308. In the past year, however, a net profit of £1447 has been made, thus reducing the deficit to £1860. Last year seems to have been exceptional, for in the previous one a profit of £3690 was realized, which was handed over to the Salford Improvement Fund.

The Lambeth Water Company, exercising their undoubted legal rights, have lately excited a commotion among their tenants by demanding their rates in advance. The rates have hitherto been collected at the expiration of each half year, but the Company have given notice that they will collect the rent due on Lady-day, and with it that which would, under the old sytem, have become due at Midsummer. What has created the most dissatisfaction is, perhaps, the manner in which the change has been made. When alterations of this kind are contemplated, the tenants are fairly entitled to a long notice.

Wimborne Minster Gas Supply.—A correspondent writes: "Gas matters here have been amicably arranged. The works, which are now situate in the town, are to be removed to a new and suitable site adjoining the railway, where entirely new works are to be erected, the plans for which have been entrusted to Mr. George Thorneloe, of London, the company's engineer."

Quality of the Birmingham Gas.—The reports of Mr. Thomas Jackson, the gas examiner, show that during the month of April, at the four gas-making stations of the corporation, 16 examinations of the illuminating power of the gas supplied to the borough were made. The maximum light in sperm candles was 17·61; minimum, 16·47; average, 17·14. The parliamentary standard is 15 candles, with Sugg's No. 1 "London" burner.

Canterbury Gas and Water Company.—On the 28th ult. a special meeting of shareholders was held for the purpose of taking into consideration the question of the repayment of loans amounting to £7500. Two courses were proposed for adoption—namely, either to borrow again on mortgage, or to create 750 new £10 shares, and after some conversation it was unanimously decided to carry out the latter suggestion. A resolution was agreed to, that the shares should be distributed, as the Act of Parliament directs, *pro ratâ* among the present shareholders.

The Recent Explosion of Gas at Brighton.—At the meeting of the Brighton Town Council, on Wednesday last, the Works Committee reported that they had received a letter from the insurance companies with whom the property in Market Street and King's Road, damaged by the late explosion of gas, was insured, asking whether the corporation were prepared to admit their liability to make good the loss. The committee instructed the town-clerk (Mr. James A. Freeman) to reply that the Town Council were not prepared to admit any liability; on the contrary, they denied that the corporation were liable for the accident or its consequences. The course adopted by the committee was approved.

Waste of Water at Birkenhead.—At the Police Court, on the 19th ult., a man named Butler was sommoned for wasting the township water. The case was proved by water-inspector Jones, who said he found the valve of the defendant's closet tied up with wire, and the water running to waste. On speaking to Mrs. Butler, she said the water had been running away for about a month, and Mr. Jones estimated that there had been a waste of 250,000 gallons. For the defence it was said that the cistern was out of order, and the landlord of the house had not attended to it. There were two other cases against the defendant, who was fined 20s. and costs in one, and 5s. and costs in the others. The Magistrate remarked that if every householder were to let the same waste go on, there would be no water for the use of the inhabitants.

Odessa Water-Works Company, Limited.—At the meeting of this company in London, on the 30th ult., the report, an abstract of which we gave in our last, was adopted, and it was resolved "that a dividend at the rate of 1½ per cent. be and is now declared upon the A shares of the company for the year 1876, to be payable only when funds are available, and notice to that effect be given by the board; and that this meeting approves the creation of a debenture stock, bearing interest at 5 per cent. per annum, to rank after the mortgage debentures of the company now issued or hereafter to be issued, and that all or any warrants for dividends upon the A shares, for the years 1875 or 1876, be taken in payment for such stock in unbroken pounds, if tendered during the current year, and that all such stock be issued in such manner, upon such terms, and subject to such regulations as the board may from time to time prescribe."

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

DR. FRANKLAND AND THE LATE DR. LETHEBY.

Sir,—In the course of his cross-examination by Mr. Philbrick, on Wednesday last, before the Select Committee of the House of Commons on the Crystal Palace District Gas Bill, the following question was put to Dr. Frankland:—

"Now let me ask you this . . . Do you not know that Dr. Letheby himself, conducting his own experiments in his own way . . . actually prohibited the use of these large cylinders, because they led to results that could not be trusted?" Answer: "*If he did abandon them, it would be because they gave too much sulphur.*"

Now, these words convey a grave imputation, and I must ask space for a reply.

For the last twenty years I have been more or less engaged with the late Dr. Letheby, and more especially in connexion with gas questions. Dr. Letheby was always well aware that his sulphur apparatus did not secure all the sulphur in gas, and was desirous to improve its efficiency. With this object, about 1861 (I being at the time engaged with him) we were making parallel experiments with one of the larger cylinders, and with two of a smaller size connected together, when the unexpected fact was discovered that 99·100ths of the sulphur caught was detained in the first of the smaller cylinders, and that the quantity there found was always greater than that found in the larger cylinder. As soon as this result had been confirmed by repeated experiments, the use of the larger cylinder was discontinued, and Dr. Letheby directed Mr. Sugg in the future to furnish the smaller whenever the sulphur apparatus was ordered.

These are facts within my own knowledge, and I relate them in justice to the memory and reputation of my deceased friend.

13A, *Great George Street, S.W., May* 5, 1877. W. T. Fewtrell.

THE GAS REFEREES AND THE BOARD OF TRADE.

Sir,—Having been abroad when the letter from the Referees to the Board of Trade, inserted at p. 666 of your last number, was written, I wish to add my individual disclaimer of any intention to cast imputation on my professional brethren, the engineers connected with The Gas-light and Coke Company. I have a high opinion of some of these gentlemen, with whom I am personally acquainted, and I know nothing—and would certainly insinuate nothing—to the disparagement of any.

I regret that such an impression should have existed, and it can only have arisen from a misunderstanding as to the sense of our communication.

William Pole.

Westminster, May 5, 1877.

SUGGESTED EXHIBITION OF GAS APPARATUS AT BRISTOL.

Sir,—One word upon this—don't! There are, to me, several reasons for saying this. The principal one is, that as it is probable the movement will be general, from the interest which has been taken in it by the public, the next Exhibition should be promoted by a representative body, such as the British Association of Gas Managers, with the view of producing a model one, which provincial gas companies could follow and promote in their own particular localities. For this to be done, and as great a success as possible ensured, the affair should be well thought out and thoroughly organized. It is manifest there is no time for this for the Bristol meeting; London is the place for the Association to hold such an Exhibition, and if they do, there is no reason why the scope of it should not be enlarged—general apparatus, gas-fittings, products of gas-works, plants grown in gas-works, and raw materials, with pipes, &c., exhibited. Such an Exhibition would be worthy of us as an Association, and worthy of the profession, the manufacture, and the business. Such, I do not doubt, would be a commercial success; but the companies and manufacturers should subscribe to a guarantee-fund. Let a committee, with power to add to their number, be appointed at our next meeting to carry this out. South Shields will then see how well its labours have been appreciated, and other towns will then have a Metropolitan model to follow.

South Shields, May 5, 1877. W. J. Warner.

Shoreham Water Company.—The half-yearly meeting was held at Brighton, on the 28th ult.—Mr. W. Hall in the chair. The report stated that there had been a steady increase in the business of the company, 58 additional services having been laid on during the past six months. There was an available balance of £296 15s. 11d., out of which a dividend of 3 per cent. (making 5 per cent. for the year) was recommended, which would absorb £225. The report was unanimously adopted, and the retiring directors and auditor having been re-appointed, the meeting terminated with a vote of thanks to the chairman.

Macclesfield Corporation Gas Supply.—General inconvenience was caused on Friday, the 27th ult., by a failure in the gas supply. The town was left almost in darkness for two or three hours, and shopkeepers and others had to resort to lamps and candles for lighting up their establishments. The pipes for several hours appeared to be charged with air instead of gas, and it was not until general business hours were almost over that the supply was of adequate illuminating character. This failure of the gas supply was very properly the subject of consideration at the ordinary meeting of the Gas Committee on Monday morning—Alderman Stancliffe, the chairman of the committee, presiding. The mayor also was present, and there was a full attendance. The following are the recorded minutes of the meeting:—"The gas manager (Mr. Lyon) having been called upon for his reasons why unilluminating gas was supplied for several hours on Friday evening last, whereby the town was left almost in darkness for a length of time, and he having stated that two pipes were left open admitting atmospheric air to mix with the gas, that he left the works in that state about 4.30 p.m., and did not return thereto till 7.30, when the darkness was being suffered, which explanation was not satisfactory, and having been duly considered, it was resolved that notice be given to the manager that his term of service cease in two months from this date. This notice was accordingly given by the chairman to the manager, then present. Also resolved that a gas manager be advertised for at a salary of £200 a year." (This is an increase of £50 on the present gas manager's salary.)—*Macclesfield Courier.*

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CXXXIII.

SERVICE-PIPES (*continued*).

The ordinary appliances for drilling mains for connecting service-pipes are the ratchet-brace and diamond-pointed drill, fig. 17. In using these, there is necessarily an escape of gas until the hole is completed and tapped, and the service-pipe inserted. Various instruments, however, have been invented for performing the work without loss of gas, thus obviating not only the escape, but the risk of accident attendant thereon.

The apparatus invented by Mr. Upward, shown in fig. 18, answers the purpose admirably. The drill-post is secured to the main by a clamp chain, which serves for a variety of pipes of different diameters. The cutter, which is of the construction shown in the engraving, works in an air-tight cylinder. When the ratchet-brace is turned by the handle in the usual way, the cutter, on being fed by the screw, makes a circular channel in the iron, which is gradually deepened until a small button is cut out. This button is held in a hollow at the bottom of the drill, and is withdrawn with it. The feeding-screw is telescopic in construction, in order to admit of the apparatus being worked in a space where the room is limited. As soon as the hole is formed, the tapping begins, and is completed when the tap comes home to the shoulder. The piston-tap and drill are then removed by working the ratchet backwards, and the valve at the side is closed. A cap, fitting the cylinder gas-tight, and having a vulcanized india-rubber top, is now put on, the service-pipe is inserted through a door in the cap, and on the valve being opened is screwed up and completed.

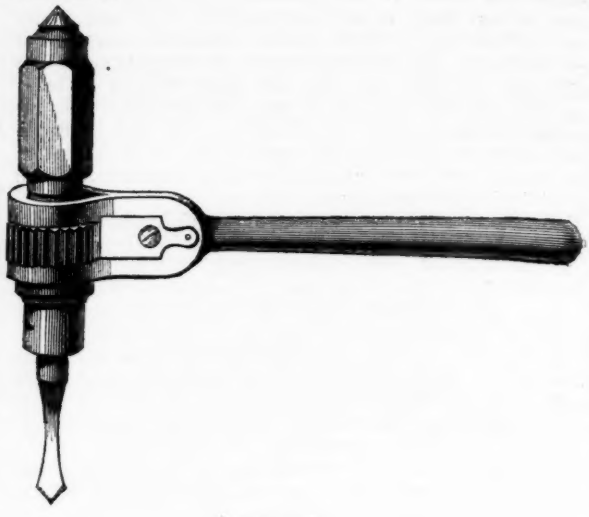

FIG. 17.

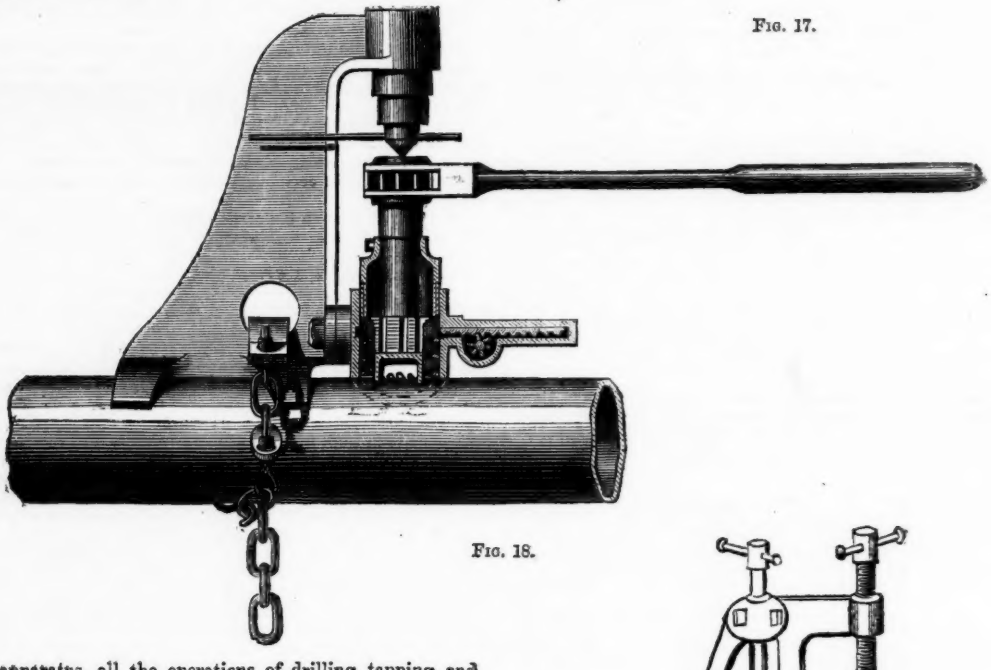

FIG. 18.

With this apparatus, all the operations of drilling, tapping, and inserting the service-pipe are accomplished in a quarter of an hour or twenty minutes, without the slightest escape of gas, and hammers, chisels, gouges, and rymers are entirely dispensed with. In confined situations, and in deep cuttings, in the vicinity of cellars, into which there is a liability of any escaping gas entering, and in subways, the use of this apparatus is invaluable.

Mr. Rafferty also devised an apparatus of the kind, which will be readily understood from figs. 19 and 20 and explanation. The apparatus consists of a small bag made of india-rubber, in the form of a frustum of a cone, fastened to the gas-main by straps and buckles. In the interior are fixed self-acting closing and opening doors, made of overlapping flaps of india-rubber, to allow the drill, rymer, and tap to be introduced or withdrawn, as required. These latter are worked in the ordinary way by a ratchet-brace, which is supported by a light stand firmly chained to the gas-main.

The accompanying engraving is a view in perspective of the apparatus when in operation; *a* represents the gas-main to which it is required to connect a service-pipe, a cock, or a plug; *b* is a bag made of india-rubber, within which are the valves or doors, *c*, shown in section in fig. 20. The upper one is formed by cutting a slit in a disc of india-rubber, and the lower one consists of two overlapping flaps; these doors yield to allow the tool to pass, and when this is withdrawn they close again by their own elasticity, and prevent the escape of the gas. A ledge is made all round the base, forming a recess, to receive the borings in drilling the hole, and in screwing. The stand, *d*, is secured to the main by the chain, *e*, which passes under the main, and is hooked to the bridle,

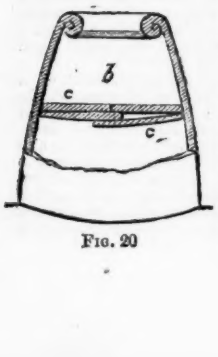

FIG. 20

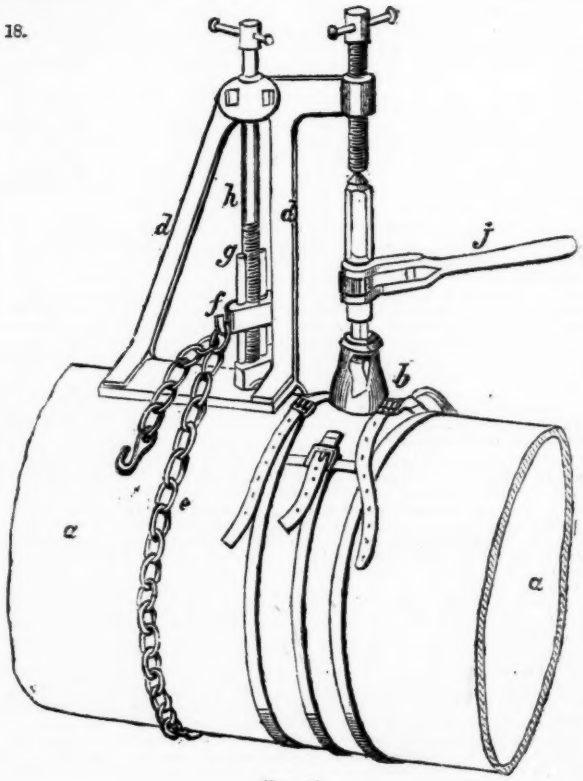

FIG. 19.

f, guided by the studs, *g*, and raised by the screw, *h*, to tighten the chain. The stand, *d*, also supports the screw, *i*, the end of which bears upon the end of the ratchet-brace, *j*.

The mode of operation is as follows:—When the stand, *d*, has been secured to the main, the requisite hole is bored through about three-fourths of the thickness. The gas-bag, *b*, is then placed in position, care being taken that its centre corresponds with the centre of the hole that has been partly bored. The drill is then passed through the gas-bag, and the hole is completely bored through, rymered out, and tapped by the usual tools. The drills, rymers, and taps are made with a shoulder resting on the top of the gas-bag, and this, as the tool penetrates the main, serves as a joint to prevent the escape of gas. When the hole is screwed it is ready for the service-pipe, cock, or plug; but, before removing the gas-bag, it is closed by reinserting the drill, which has a recess near its shoulder to receive an india-rubber ring, and this ring prevents the escape of the gas while the apparatus is removed, and the service-pipe, cock, or plug is got ready.

(*To be continued.*)

Parliamentary Intelligence.

HOUSE OF LORDS.

TUESDAY, MAY 1, 1877.

The CHAIRMAN of COMMITTEES informed the House that the opposition to the Sittingbourne Gas Bill was withdrawn.

The Longton Corporation Bill was read a second time and committed.

THURSDAY, MAY 3.

The Tudhoe and Sunderland Bridge Gas Bill, brought from the Commons, was read the first time, and referred to the Examiners.

GAS AND WATER ORDERS CONFIRMATION (BROTTON, &c.) BILL.—This Bill, for confirming certain Provisional Orders made by the Board of Trade under the Gas and Water Works Facilities Act, 1870, relating to Brotton Gas, Guisbrough Gas, Bridport Water, Burgess Hill Water, Ruthin Water, and Pickering Gas and Water, was read the first time, and referred to the Examiners.

FRIDAY, MAY 4.

The Examiners reported that the further Standing Orders applicable to the Maryport District and Harbour (Gas) Bill have been complied with; and that no further Standing Orders are applicable to the Kent Water and the Stamford Water Bills.

The Carnforth District Water and the Leeds Improvement Bills, brought from the Commons, were read the first time, and referred to the Examiners.

A petition against the Kent Water Bill was presented from the Bromley Local Board.

HOUSE OF COMMONS.

MONDAY, APRIL 30, 1877.

The Carnforth District Water Bill, as amended, was considered.

The Leeds Improvement Bill, as amended, was considered. Three clauses were added, and amendments made.

A petition in favour of the Bishop Auckland District Gas Bill was presented from Inhabitants and consumers of gas in South Church.

TUESDAY, MAY 1.

The Tudhoe and Sunderland Bridge Gas Bill was read the third time and passed.

The Louth Gas Bill, as amended, was considered.

The Epsom and Ewell Gas and the Dukinfield and Denton Local Boards of Health Bills were reported.

The Hanley Corporation Gas Bill was reported, "Preamble not proved."

WEDNESDAY, MAY 2.

The Alliance and Dublin Consumers Gas (Bray Supply) Bill, as amended, was considered, and an amendment made.

The Ramsgate Water Bill was reported, "Parties do not proceed."

The Ramsgate Local Board (recommitted) and the Thanet Gas Bills were reported.

LOCAL GOVERNMENT PROVISIONAL ORDERS (GAS) CONFIRMATION (PENRITH, &c.) BILL.—This Bill, to confirm certain Provisional Orders of the Local Government Board relating to the Local Government districts of Penrith, Silsden, and Ynyscynhaiarn, was read the first time, and referred to the Examiners.

The United General Gas Company (Limerick) and the Waterford Gas Bills were referred to a Select Committee, consisting of Mr. Norwood (chairman), Mr. Richard Bright, Viscount Folkestone, and Mr. Ernest Noel; to meet on Wednesday, May 9.

THURSDAY, MAY 3.

The Carnforth District Water and the Leeds Improvement Bills were read the third time and passed.

The Wakefield Gas Bill was reported.

The Reservoirs Bill was considered in committee, and reported, with amendments.

FRIDAY, MAY 4.

The Bolton Improvement, the Leicester Gas, and the Sunningdale District Water Bills were reported.

The Crystal Palace District Gas Bill was reported, "Preamble not proved."

The Newport (Monmouthshire) Gas Bill, as amended, was considered.

The North Cheshire Water Bill, as amended, was considered, and an amendment made.

The Louth Gas Bill was read the third time and passed.

A petition against the new Standing Order, "Gas Companies Additional Capital," was presented from the Flint Gas and Water Company.

A petition against the Blackburn Borough Gas, Water, and Extension Bill (Lords) was presented from Matthew Brown.

The constitution of the Select Committee on the United General Gas Company (Limerick) and the Waterford Gas Bills was altered by the appointment of Mr. Arthur Vivian in place of Mr. Norwood. Mr. Richard Bright to be chairman.

HOUSE OF COMMONS COMMITTEES.

TUESDAY, MAY 1.

(*Before Mr.* ASSHETON, *Chairman*; *Messrs.* SMITH, BELL, *and* DUNDAS; *Mr.* BONHAM-CARTER, *Referee.*)

RAMSGATE LOCAL BOARD (RECOMMITTED) BILL.

(*Continued from page* 666.)

Mr. GRANVILLE SOMERSET complained of what he described as a breach of faith. He said that during the contest between the Isle of Thanet Gas Company and the Ramsgate Local Board his clients (the Corporation of Margate), who were the urban sanitary authority in that town, appeared on petition, in which it was stated that by clause 60 of the local board Bill certain means were provided by which the petitioners were to acquire a transfer of the Margate portion of the undertaking. Previously to the presentation of the petition, an agreement to that effect had been come to between the authorities of the two towns. It was on the faith of that agreement that the clause was introduced into the Bill, the preamble of which stated that "whereas it is expedient that provision be made for enabling the Mayor, Aldermen, and Burgesses of Margate to acquire . . . so much of the undertaking of the gas company . . . which now supplies the borough of Margate and the neighbourhood thereof, and that the provision hereinafter contained for the transfer of so much of the said gas undertaking to the said Mayor, Aldermen, and Burgesses be made accordingly." But that provision was now struck out.

Mr. O'HARA submitted that as the Margate petition related only to the 60th clause, which was struck out of the re-committed Bill, his learned friend could not now be heard against the preamble.

Mr. SOMERSET said he intended to call a witness to prove what was the agreement between the parties.

The CHAIRMAN said he thought Mr. Somerset had better proceed.

Mr. SOMERSET proceeded to read the clauses of the original Bill relating to the transfer of the Margate portion of the works to the corporation in the event of the Bill passing. Those clauses, without the knowledge of his clients, had, by arrangement with the Thanet Company, been eliminated from the Bill, and his clients were left out in the cold. He was not going to argue the question whether it was advisable for corporations and local boards generally to have the control of gas-works, but he would say that, if in this particular district it was considered advisable for the Ramsgate Local Board to have such control, it was now much more so in the case of Margate, which would otherwise be left in the hands of a company who had no interest in the town, except to make money out of it. The public would be thus placed at a great disadvantage. He did not say that the arrangement which had been come to between the company and the Ramsgate Local Board was fraudulent, but he maintained that it was a very gross breach of faith, and he asked the committee to remedy the mischief occasioned to his clients by reinserting the clauses in the Bill so as to leave them in the same position they were in before.

Mr. CHANDOS LEIGH said he objected to the *locus standi* of his learned friend as against the Isle of Thanet Gas Bill, inasmuch as there was no petition from Margate against it.

Mr. SOMERSET admitted that technically he had no right, but if he was objected to here he would have the right to appear on petition in the other House.

Mr. POPE said it was not a question of *locus standi*, but a question as to what the committee could hear his learned friend upon, inasmuch as his clients had not petitioned against the Thanet Gas Bill.

Mr. O'HARA said the Margate petition was directed to a certain section in the local board Bill, and that section was struck out. There was no agreement in the matter, and his learned friend was stating that which was not the fact.

The committee-room was then cleared, and, on the counsel and parties being again called in,

The CHAIRMAN said: The committee are of opinion that the Bill which is now placed before them is in a different position from what it was when it was previously before the committee, and that under these circumstances the petitioners—we mean the Corporation of Margate—have a right to amend their petition, and to be heard against the preamble of the local board Bill.

Mr. *G. F. Kelcey*, examined by Mr. GRANVILLE SOMERSET.

I am town-clerk of Margate, and instructed counsel originally to appear on the petition against the Bill of the Local Board of Ramsgate. The matter was considered by the Corporation of Margate on Dec. 12 last, and this resolution was passed—"That this council approve of the project of the Ramsgate Local Board to obtain parliamentary powers in the ensuing session to purchase the whole of the undertaking of the Isle of Thanet Gaslight and Coke Company, provided that clauses be approved by the council and inserted in the Bill, making provision for the transfer to the corporation, on equitable terms, of that portion of the undertaking within the parish of St. John the Baptist." That resolution was sent to the clerk of the Local Board of Ramsgate; and I presume, in consequence of that, clauses 60 and 61 were inserted in the Bill. There was a meeting of the ratepayers of Ramsgate, and a poll was demanded, which took place in the early part of February; and on the 5th of that month the clerk to the local board wrote to me, notifying that the poll had resulted in favour of the promotion of the Bill, and he said—"The committee hear that some doubt has been expressed at Margate as to the incidence of the costs incurred by the local board in the parliamentary contest last session. I am desired to state that it never was, and is not intended, that Margate should be asked to pay one farthing for such expenses, and the committee will insert in their Bill any clauses approved of by your council to make this point clear." Upon that we took steps under the Borough Funds Act to consider the propriety of opposing the Bill promoted by the local board, and a meeting of the Town Council on the 23rd of February resolved to do so, it being understood that the opposition should only extend to protect the interests of Margate so far as the transfer of the Margate portion of the works was concerned. We were, therefore, substantially part promoters of the Bill, retiring from the opposition if we had proper power to purchase. The chairman of the Ramsgate Local Board was present at the meeting, and knew all that was going on, and we relied from beginning to end upon the agreement contained in the preamble and clauses of their Bill which are now struck out. We ask to be kept in the same position still. I only heard of the arrangement come to between them and the company by accident last Tuesday morning. If a transfer of the Ramsgate portion of the works to the local board does take place, we think we ought also to acquire the Margate portion, or we shall be placed in a very inconvenient position.

Cross-examined by Mr. O'HARA: There was no definite agreement come to between the corporation and the local board. A print of the Bill having been sent to us with the clauses inserted, making provision for transferring the Margate portion of the works to us, we were prepared, with a slight amendment of those clauses, to accept the Bill as it stood. We did not present a petition against the Thanet Gas Bill. The corporation intended to appear against it when it got into the House of Lords.

Re-examined by Mr. SMITH: If the preamble of the local board Bill had passed with these clauses in it, there would have been no necessity to oppose the Thanet Gas Bill.

At the suggestion of the REFEREE,

Rev. *E. G. Banks* was recalled, and examined by Mr. O'HARA.

I am now chairman of the Local Board of Ramsgate. I have read the preamble of this Bill. It is true in substance and in fact. We have made an agreement with the Isle of Thanet Gas Company with respect to their Ramsgate works. We could have come to an agreement before if we had chosen to be dishonourable to Margate; but we considered that we ought to stick to them until our preamble was declared not proved. We made the best bargain we could for Ramsgate, leaving the Margate works in the hands of the company, subject to whatever provisions the committee may make. I gave evidence before in favour of the whole of the original preamble, which stated that it was expedient that provision should be made to enable the Margate Corporation to acquire so much of the company's undertaking as now supplies the borough of Margate.

Mr. O'HARA: Was it your opinion that it was expedient, as stated in the old preamble.

Witness: I can answer that question if the chairman thinks it right.

Mr. SMITH: Have you changed your opinion, and do you now think that part of the preamble should be struck out?

Witness: I think it is better for Margate, and for all corporations, that they should have the works; but when Margate wants to get them, and we are to pay, I think these are different circumstances altogether. We only began our communications with the gas company at the last moment before the meeting of the committee. We did not make any communication to Margate on the subject; we did not think there was any reason for doing so. We have not been acting together in a friendly way up to the time of the breaking up of the committee before the recess. It was partly an understanding with us that they should oppose the Thanet Gas Bill, but they refused to sign the petition, and, therefore, we were not bound to them at all. There was no agreement that they should pay a part of the expenses we were put to in respect of that Bill, only for the promotion of our own Bill; and if we get our Bill, I am afraid we shall have to fight for it.

Re-examined by Mr. O'HARA: When we promoted a Bill last year we tried to get Margate to come to terms, the contention of the company being that we ought not to take one portion of their undertaking without the other. But we were met with the opposition of the mayor, he being the chairman of the water company, and also trustee for a great number of gas shareholders. He told me distinctly that he was opposed to us, and that he could not get the corporation to help us. At the same time, he thought the town wanted the works, so that he was in an awkward position. In consequence of his vacillation we found ourselves in a fix, whether to include Margate or not, and on the day previously to that for depositing petitions, I went to him and tried to persuade him to do it, but he said it was too late to do anything. The corporation then refused to petition against the gas company's Bill, but they did petition against our Bill on the 60th clause. The mayor himself refused to come and give evidence for us before the committee, and we said that we could do nothing, and must drop the Margate part of the Bill. The town-clerk also told me he thought it was the proper course for them to take to support us, but he could not get the corporation to see the matter in that light. They thought that by our doing it and spending the money they might possibly get an advantage, and we have to pay. More than that, I believe, in the Margate Improvement Bill, they first of all had clauses to purchase the gas-works, and those were struck out.

Mr. SMITH denied the correctness of this statement.

Mr. O'HARA having addressed the committee on behalf of the local board,

The room was cleared, and after a time counsel and parties were called in.

The CHAIRMAN: The committee have determined that the preamble of the Bill, as proposed on re-committal, is proved. We take it with the clauses relating to the Margate portion of the undertaking of the Thanet Gas Company struck out.

The clauses were then proceeded with.

On clause 62, relating to the capital to be authorized for the gas and water undertakings,

Mr. *G. W. Stevenson* was recalled, and examined by Mr. COOPER.

I have not prepared a detailed estimate for the £90,000 referred to in the preamble of this Bill with reference to the water-works, or the £80,000 with reference to the gas-works. It is impossible to ascertain how this money will be expended over a series of years—say, over the next 10 or 20 years. We know that the water-works do require some considerable extension, which will involve an immediate outlay of money, and that pipes are required to be laid to points to which they are not yet laid. There is no doubt that the difference between the sum which the local authority are paying for the gas and water undertakings and the sum they are seeking power to borrow will be required for capital purposes within the next 10 or 15 years. I can specify some things; but a detailed estimate would be misleading, and would be of very little value.

Mr. COOPER: Of the £90,000, does part consist of £70,000 to be paid to the water company? and in the case of the £80,000, does part of that consist of £65,000 to be paid for the gas undertaking?

Witness: Yes. A new gasholder is required at once for the gas-works—they are very short of storeage room—and that will absorb quite £6000.

The clause was agreed to.

Mr. POPE stated that no provision was made in the Bill with reference to the presence of sulphur compounds in the gas, the question of the purification of gas from these compounds being at the present time under the consideration of a committee on another Bill.

The remaining clauses in the Bill, with amendments and additions, and also the schedules and M.S. clauses, were discussed and agreed to.

The chairman was ordered to report the Bill, as amended, to the House.

RAMSGATE WATER BILL.

WEDNESDAY, MAY 2.

Mr. MICHAEL said the course he had to adopt was to withdraw this Bill, as there was no object to be gained in proceeding with it. He therefore considered himself relieved from the pledge he gave the committee to proceed with it.

The CHAIRMAN: You withdraw the Bill?

Mr. MICHAEL: We withdraw the Bill, for I see no object in proceeding with it.

Mr. BIDDER: I quite assent.

The CHAIRMAN: We absolve you from your pledge with regard to that.

Mr. MICHAEL: That is why I mentioned it to you, in order that you might relieve me from the promise I made.

The Bill was then withdrawn.

THANET GAS BILL.

WEDNESDAY, MAY 2.

Mr. MICHAEL said the promoters, although their undertaking was cut in half, were obliged to proceed with this Bill, so as to regulate that portion of their undertaking still remaining, which related to Margate.

Mr. BIDDER, who represented the Ramsgate Local Board, objected to the Bill in the form now presented to the committee, alleging that if the Ramsgate Local Board Bill should from any contingency fall through, this Bill would be binding on his clients. His learned friend's Bill, as framed, did not leave out the Ramsgate portion, but dealt with the capital and improvement stock of the company as a whole, inserting a clause, however, to the effect that from and after the vesting of the Ramsgate portion in the local board these figures should be reduced to half. The consequence would be that if the Local Board Bill failed to receive the Royal Assent his clients would be committed to a valuation of the capital of the company which would bind them in future.

Mr. MICHAEL maintained that what his learned friend desired was exactly what he had done. He had dealt with the matter as though for twelve months, or the period for which the undertaking was to be carried on as a whole, it was all subject to the terms of the contract entered into, and now forming part of the local board Bill. As the referee had taken some objection, as not being within the powers of the promoters, he (Mr. Michael) was ready to strike that out; but the underlying principle was this, and he must draw attention to the terms of the contract entered into with the local board. The vesting period was different from the time of purchase. The vesting period could only occur when the money was paid, but the time of purchase referred back, and occurred at a period anterior to that at which the Bill would pass—*i.e.*, from Jan. 1, 1877, the company carrying on the undertaking subsequently, and until the vesting period, as trustees for, and at the risk of the local board, and they were to be paid a certain sum of money. Therefore, in the contingency mentioned, they must provide for carrying on the undertaking under any circumstances; and whatever was their capital, it did not affect his learned friend's clients in any way. They were to pay a certain sum—4½ per cent. —upon the amount of the purchase-money, and, therefore, whatever the company's capital was, it could not in any contingency matter to them. With regard to Margate, the plan was this: As soon as the vesting period came, the undertaking of the company would be cut in half, capital and everything else, and it was provided that from that time they should not supply any gas within Ramsgate and St. Lawrence.

The REFEREE said if he understood Mr. Bidder's contention aright, it was that, supposing his Bill did not pass, he might hereafter be in such a condition with regard to the additional capital as to be obliged to purchase the property of the company, taking that into consideration.

Mr. MICHAEL said it was impossible it could be so, because the price to be paid by Ramsgate was fixed. It was not as if they had to go before an arbitrator at the vesting period to fix the sum to be paid.

Mr. BIDDER said his point was this—it had been agreed between the company and the local board to carry out the purchase, and they had reason to believe the Bill to enable them to do so would become law, but they could not shut their eyes to the fact that some extraneous opposition might yet arise in the other House. Supposing it did, and the local board Bill fell through, his clients would be under the *régime* of this new Thanet Gas Bill for the future. This was the second session in which the local board had come to Parliament at an enormous cost to the ratepayers, and it was questionable whether the ratepayers would be willing to spend money on a third gas fight. He was, therefore, bound to look to this contingency, that if the present Bill passed in the form in which his learned friend chose to put it, his clients might in future be bound by it. He, therefore, asked that this Bill should be confined to Margate, and that under it the promoters should acquire no new rights which would fetter him in the future. There was, for instance, the standard price for gas named in the Bill; he should contend that it was an improper price if it affected his clients. Then again the amount of the improvement stock; he maintained that it was excessive and unreasonable, and there were various other matters that he should have to bring forward if there was any possibility of the company still having the control of the Ramsgate supply. He should also require to have provisions inserted with regard to the public lighting, the breaking up of streets, &c. He now proposed to insert this clause: "The powers and provisions of this Act with reference to standard price, and all other matters relating to the supply of gas, shall relate only to the Margate portion of the undertaking." If this clause were inserted, it would relieve him from the necessity for discussing with the promoters whether the powers asked for by them in their Bill were right and proper.

Mr. MICHAEL could not agree. His learned friend's argument proceeded upon a fallacy—viz., that, in order to carry out the agreement, it was necessary to have an Act of Parliament. This agreement was quite as binding upon the company as upon the local board, and was enforceable under the Public Health Act of 1875. It was not stated in the contract that, if the local board failed to carry their Bill, the agreement should be void, and of no effect.

Mr. BIDDER asked that an article should be put into it to the effect that the bargain might be confirmed, if necessary, in a subsequent session.

Mr. MICHAEL said he would do so with pleasure if that would relieve his friend from the difficulty.

The CHAIRMAN: What is the suggestion?

Mr. MICHAEL: The suggestion is that they may have the power—and we will help them to it by every means at our command—to pass a Bill in any subsequent session of Parliament. They are already relieved, for they have only £4 10s. per cent. to pay on the purchase-money, even if the matter be deferred for five years, while they realize the whole of the profits, the company being only trustees for them to do exactly what they desire, and at their risk. It is just the same as though the purchase-money were already deposited in a bank, and the company were getting 4½ per cent. upon it, but were not able to draw it out.

After some further discussion the room was cleared, and the committee deliberated. On the parties being called in,

The CHAIRMAN said: We think that the provisions of the Thanet Gas Bill should deal with the Margate portion of the undertaking only, and need contain nothing with reference to the contemplated failure of the agreement.

On clause 5, relating to the creation of improvement stock, being read, the room was again cleared. On the re-admission of the parties,

The CHAIRMAN said: The committee have decided that the amount of the improvement stock shall be £16,000, and that the interest upon it shall be 5 per cent.

Mr. MICHAEL: Would you now, sir, be kind enough to take evidence upon the initial price, and then you will be able to set us free.

The CHAIRMAN: We have considered the question of price, and have agreed to take the price you put in—viz., 4s. 2d.—and to insert the sliding scale and auction clauses.

The committee proceeded with the further consideration of clauses, which were agreed to, with amendments and additions, and

The chairman was ordered to report the Bill to the House.

THURSDAY, APRIL 19.

(*Before Mr.* SANDFORD, *Chairman*; *Mr.* LAMBERT, *Mr.* HANBURY, *and Sir* HUGH CHOLMELEY; *Mr.* BONHAM-CARTER, *Referee.*)

ASHTON-UNDER-LYNE GAS BILL.

ASHTON-UNDER-LYNE IMPROVEMENT BILL.

In this case the Ashton-under-Lyne Gas Company were seeking powers to raise an additional capital of £50,000, and to purchase land for the enlargement of their works. The Bill was opposed by the Ashton Corporation,

who, moreover, had introduced a Bill of their own, applying, among other things, for compulsory powers for the purchase of the works of the gas company. So far as the gas question was concerned, it was arranged to treat the two Bills as competing Bills.

Mr. CRIPPS, Q.C., Mr. POPE, Q.C., and Mr. GOULDTHORP appeared for the Gas Company; Sir E. BECKETT, Q.C., Mr. MICHAEL, and Mr. BALFOUR BROWNE for the Corporation of Ashton-under-Lyne, and also for Owners and occupiers of property in the district; and Mr. YATES on behalf of the Earl of Stamford and Warrington, petitioners against the gas Bill.

Mr. CRIPPS, in opening the case on behalf of the gas Bill, said the Ashton-under-Lyne Gas Company were established in 1825, with a capital of £30,000, and the only restraint imposed upon them in their original Act was that they should supply a light at least as good as oil would have given if the gas had not been supplied. In addition to the capital of £30,000, the company had also expended a sum of £6000 out of the profits, which they might otherwise have divided, which made their actual capital embarked in the business before the year 1847 about £36,000. In that year, however, they applied for an additional capital of £24,000, and also took power to raise that capital by what were now familiarly known as the auction clauses, and in that way they had raised the money required up to the present time. The company had been very successful in their business, the quality of their gas had been exceptionally good, and they had been enabled to supply it at very moderate prices. With regard to the new capital, the company originally proposed to raise it at 7 per cent., as had been the case for some years past with regard to other companies. Should, however, the new Standing Order proposed by the Chairman of the Committee of Ways and Means be adopted, the auction clauses would have to be taken in connexion with what was known as the sliding scale of prices. [The learned counsel then commented at some length on the proceedings before Mr. Forster's committee, when the sliding scale and the auction clauses were imposed on certain of the metropolitan gas companies.] As regarded the land sought to be purchased, a petition had been presented by a few parties within the 300 yards area, but he (Mr. Cripps) did not think the committee would be disposed to pay much attention to that, and he would proceed to certain points in which the case of the company differed from others. The Corporation of Ashton seemed to have desired to become the managers of the gas-works, and they had made several bids for them to the directors and shareholders of the company. In several cases unquestionably certain corporations had made arrangements with the gas companies, and those arrangements had been confirmed by Parliament; but it would be an entirely new thing for Parliament to give compulsory powers to buy up the interests of a gas company against the consent of such company. Under any circumstances a case must be made out, and, inasmuch as the company were not willing to sell, but the corporation sought for compulsory powers to purchase, it must be because the company had failed in their duty to the public. If the company, as alleged in the petition of the corporation, grossly exceeded their rights, and had charged the public very high, or had supplied them with bad gas, or had committed any misdeeds of that kind, there would be some ground in favour of compulsory purchase; but they could not prove anything of the sort. So far as individual members of the corporation were concerned, they might like to have more business to do, or they might like the superior authority of having a number of things to manage, and so sought to get the gas supply into their power. They might also like to get a profitable thing into their possession, so as to assist the rates. That was very intelligible; but they must go a great way further than that before they could lay a foundation for a case of that kind; they must show the desire of the consumers in the matter, and they must also show that the corporation could give a better supply. If there were any special matters in the case, they would tell extremely against the proposals of the corporation, because the area of supply was very much beyond the area of the borough. It happened that the area of supply was about four times what it would be in the borough only; and, consequently, if the works passed to the corporation, they would be nothing more than another company as regarded three-fourths of the area. The corporation would very likely say that the company did not apply to Parliament for new powers until they found out that the purchase was contemplated, and that was true, but they would have had to apply next year. When the Bill of the corporation came on, the company would show in detail a variety of reasons why they did not think there was the slightest pretence for their application. If the committee decided to impose upon the company the auction clauses and the sliding scale, a very important question would arise as to the commencing price from which to slide either way.

The CHAIRMAN said that point had better be reserved.

Mr. CRIPPS said he would produce evidence to show that the business of the company had been conducted properly and economically. He would also show that no change was desired by the consumers and customers of the company—no change, at any rate, in desiring the supply to be in the hands of the corporation.

The following evidence was then called:—

Mr. *A. Buckley*, examined by Mr. GOULDTHORP.

I am secretary and solicitor to the Ashton Gas Company, and have had more or less to do with the affairs of the company for at least 15 years. The original Act of the company was obtained in 1825, and the capital authorized was £30,000. The company were also empowered to carry out a water-works scheme, but that has never been done. The original capital was raised in 1200 shares of £25 each, and in addition to that capital the company spent £6000 out of profits, which amount was capitalized by Parliament in 1847. In that year the company were also authorized to issue some new shares, of £30 each, under what are called the auction clauses. The shares were to be put up in lots, and such lots were not to contain more than 40 shares. The new capital, which amounted to £24,000, was to bear 10 per cent. interest on the nominal amount of the shares, and any premiums obtained were to go to the credit of the company, but not to have any interest paid on them. The effect is that at the present time the real capital of the company is £59,800 odd, while the dividend-paying capital is only £47,700. We did not obtain any borrowing powers under the Act of 1847. By the same Act this district [pointing out same] was taken from us, and all parts of the parish of Ashton-under-Lyne which were in the borough of Stalybridge, but in other respects the *status* of the company was the same as under the old Act of 1825. On Oct. 18, 1850, the first lot of 40 shares, of £30 each, was sold by auction for £2104 9s. 4d. On Sept. 30, 1851, 80 shares were sold for £4532 1s. 5d. On Aug. 31, 1855, 60 shares were sold for £3577 7s. 9d. On Nov. 8, 1865, 50 shares were sold for £3116 17s. On Nov. 13, 1874, 80 shares were sold for £5190 19s.; and on Oct. 20, 1875, 80 shares were sold for £5363 6s. The company have recently expended considerable sums in extensions, alterations, and improvements beyond what has been spent out of capital. The dividends paid since 1847 have been as follows:—For the year ending June 30, 1847, 6½ per cent.; 1848, 8½ per cent.; and since, with the exception of 1850, 10 per cent. In the year 1850 they not only paid 10 per cent., but also the deficiency of 4½ per cent. and 1¾ per cent., so as to make up the two earlier dividends to 10 per cent. In 1854 an agreement was entered into with the Dukinfield Gas Company, by which the Ashton Gas Company relinquished a certain right to supply gas in Dukinfield. At that time the Dukinfield Gas Company were applying to Parliament for additional powers, some of which the Ashton Gas Company thought detrimental to their interest. The result was that on condition of the Dukinfield Gas Company giving up those clauses the Ashton Gas Company agreed to sell the right of supplying Dukinfield, and they received £1500 for the mains which were laid in that district, that amount being subsequently applied to capital purposes. In 1870 and 1871 the price charged by the Ashton Gas Company was 4s. per 1000; in 1872, 3s. 9d.; in 1873, 4s.; in 1874, 1875, and a portion of 1876, it was 4s. 6d. In October, 1876, it was reduced to 4s. 2d., at which price it still remains. All consumers are entitled to a discount of 6d. per 1000 feet if the accounts are settled within a month or six weeks. Consumers of between 300,000 and 500,000 feet get a discount of 1d. extra, making 7d.; between 500,000 and 600,000, 2d. extra, or 8d.; from 600,000 to 800,000 the discount is 9d.; from 800,000 to one million, 10d.; from one million to 2 millions, 11d.; and above 2 millions, 1s. The price charged is the same to all consumers, both inside and outside the borough, with the exception of a small district called Haslehurst, where an extra 6d. is charged, because there are so few consumers there. In September, 1876, I received a communication from the town-clerk of Ashton in reference to the sale of the works. It was to the effect that the corporation offered to secure to the shareholders 10 per cent. on the amount of their paid-up capital, clear of income-tax, to be paid to the shareholders by the bonds or debentures of the corporation. If the purchase-money was desired by the company to be paid in cash, then the corporation offered £60 per share. If the company desired to be secured by stock of the corporation, then coupons would be granted to the shareholders at £75 for each share, bearing interest at 4 per cent., clear of income-tax. The reserve-fund was to be dealt with at the discretion of the gas company alone. The reply of the company was that the terms were inadequate, and such as the directors could not recommend their shareholders to accept. On Jan. 22, 1877, a second proposal was made by the corporation, but the directors again refused to entertain the offer. On the 22nd of February a deputation from the corporation waited upon the company, and verbally offered to purchase the undertaking for £125,000 in cash, or to give coupons in stock to the extent of £78 12s. 4d. in respect of each £30 share. A meeting of the directors was held on the 24th of February, and a resolution was passed by them declining to accede to the purchase, which decision I communicated to the town-clerk.

Cross-examined by Mr. BROWNE: I am a small shareholder in the company, and paid between £60 and £70 for my shares. The last shares that were sold in the market realized £75 each, I believe.

By the CHAIRMAN: Those shares were sold subsequent to the corporation offers, but I believe the shares sold previous to that fetched about £67 or £68 each.

Cross-examination resumed: There are 81 shareholders in the company, holding in all 1599 shares. I had nothing to do with getting up the petition against the Bill of the corporation, although I signed it on behalf of a coal company. My brothers and myself are sole owners of the Limehouse Coal Company, and have supplied a portion of the coal required by the gas company, but I think the larger portion of their coal has come from Dukinfield. The reason we are applying for our Bill is because we have exhausted all our capital powers, and an increased supply of gas is necessary. I do not admit that the supply is insufficient at present, but we must look ahead, and take the natural rate of progression we have had before. After obtaining power to raise fresh capital, it will take probably two or three years to erect the necessary works. All corporate bodies are supplied on precisely the same terms as private consumers; the only difference is that the more gas they consume the larger discount they get. The £6000 which was capitalized in 1847 had been spent out of profits, so that the shareholders lost their dividends to that amount. At one period we had a reserve-fund, but it has been exhausted, and we owe money to our bankers. When we sold our pipes to the Dukinfield Gas Company, the company had a concurrent power with ourselves for the supply of that place, and we thought it was better to come to a friendly agreement than to have a collision. That district is very populous now. Supposing the supply of the Dukinfield district to have been remunerative to some extent, the consumers of Ashton-under-Lyne have been disadvantaged by the transfer. If we could have made a very large profit there, it would have had a tendency to lessen the price of gas a little; but there is this question to consider, that in Dukinfield, in my opinion, it would not have been a remunerative business, because we were in competition with another company, and anything we had done there we should have had to do probably without any profit at all. Our works at Ashton are closely surrounded by houses on all sides; they are between 250 and 300 yards from the town-hall. If gas could be manufactured in a less populous place, it would, no doubt, be better, but the works have been there for 50 years. We are only proposing to add a small piece to that station. I think it is probable we might procure land elsewhere for our works if we paid a sufficient price for it. I think the price charged by the Ashton Company is low, in comparison with any of the towns in the district, excepting, perhaps, Manchester, but they have there a very large area of supply, and consequently can make gas cheaper than we can. I believe it is a usual thing for large consumers to get gas cheaper than small ones. I am not aware it is inserted in Acts of Parliament, but there is nothing to prevent companies from doing so, and, as a matter of practice, I think it is done. With regard to the offer of purchase, speaking as a consumer, I should want something more than the offer of 10 per cent.; I should want the corporation, if they purchased, to be restrained from making an unreasonable profit. If I were a millowner, I should lose far more by an increased price for gas than I should gain by a reduction of rates. In the adjoining parish of Oldham, they make an enormous profit out of the gas, and I think their price is something more than ours. I will pledge myself that the average price is more.

Mr. BROWNE: If the corporation have not to pay 10 per cent. on capital they can make profits where a company could not, even keeping the price charged for gas low?

Witness: I do not say you could in this instance, because you have offered such a price for the works—£125,000.

Mr. BROWNE: You think that is too much?

Witness: It is such a price that you would have to get something back for it, and the more you pay the more you will have to get back.

Mr. BROWNE: But you say by your Bill that £60,000 are required for additional works in the district.

Witness: It is not required for to-day, but for the future.

Mr. BROWNE: You are asking parliamentary sanction to your raising £50,000 by share capital at 7 per cent., will not the gas consumer have to pay that 7 per cent.?

Witness: I am not aware that he will, because we shall have so many more consumers that we shall be able to let him off so much cheaper. I do not think the corporation could borrow £50,000 at 3½ per cent.; they might perhaps at 4 per cent.

Mr. *T. W. Mellor*, M.P., examined by Mr. GOULDTHORP.

I am a member of Parliament for the borough of Ashton-under-Lyne, and am deputy-chairman of the Ashton Gas Company. The board consists of eight members, and meets regularly on the third Monday in every month, or more frequently, if necessary. The directors also attend to the management of the works; I have myself, when in Ashton, gone through the works at least once a week, to examine the working plant,

and see that everything is in proper order. I have heard very few complaints about the supply of the gas; but there are always discontented persons to be found in every community. I consider the gas of a very good quality compared with neighbouring towns, not even excluding Manchester. There may have been complaints in the Audenshaw Local Board district, owing to insufficient pressure; but a station governor has been added to remedy that, and I have heard no complaints since. I attribute the excellent quality of our gas to the care and watchfulness bestowed on the works. We always select the very best materials, and the cannels and coals which give gas of the greatest illuminating power. I certainly consider the discount to large consumers a proper principle. I find that the corporation themselves, in some cases, allow a discount of 75 per cent. in the water supply, and in other cases 47 per cent., according to the quantity consumed. A large consumer ought to be supplied at a less cost than a small consumer, because the leakage is less, the cost of collection is reduced, and, in fact, considered in every way, he is entitled to a less price than people who simply burn 10,000 or 20,000 feet per annum. In the case of a cotton mill the leakage would be reduced, there being only one supply-pipe, instead of 50 small ones. If we did not make reductions, the large consumers would make their own gas; I believe four do so at present. I do not think it is at all desirable for the corporation to become possessed of the gas-works, and I speak as a shareholder, a ratepayer, and an inhabitant of the borough. To ask my opinion as to whether the Ashton Company have carried out their duties, is asking me to pass an opinion upon my own conduct as a member of the board, because I believe we have all been prompted with one consideration, and that is to do the best for ourselves and the public. I think if the same principle were carried out in the borough of Ashton by the corporate body, in the event of their becoming possessed of these works, which is adopted in Manchester, it would seriously affect the outlying district, because they would become indirectly contributory to keeping up all the highways, and to meet other charges incurred by the corporate body in administering the affairs of the borough. I am acquainted with all the towns within a few miles radius of Manchester. Comparing our supply inside and outside the borough with that inside and outside Manchester, Ashton comes out very favourably. I heard Sir Joseph Heron the other day state that the outside price was 4s. 8d. At Oldham the maximum price inside is 3s. 8d., and outside 4s. At Stockport the maximum price inside is 4s., and the minimum 3s. 10d.; but outside the borough the price is 4s. 8d. In fact, the average price of all the corporate towns in the county of Lancaster is 3s. 11d., and the maximum price ruling in Ashton at the present time is 3s. 8d., so that we are below the average of the entire county, where the gas is manufactured by corporate bodies. The gas consumed in the year ending June 30, 1876, in mills and workshops, was 133 million cubic feet. The amount consumed by the directors was about 8,579,500 cubic feet. One of the directors is the largest consumer of gas in the town; another is also a large consumer; and there is a third who is largely interested in ship property, which is a consuming property. I do not think the Corporation of Ashton, as consumers of gas, are sufficiently interested in the making of it. I believe 15 per cent. of the gas at present produced is retailed outside the borough. The consumption by the corporation for the year ending June 30, 1876, was 5,527,180 cubic feet, which is not 5 per cent. of the whole quantity produced at the works. I am not aware that the Bill of the corporation makes any provision for any increased demand, nor for the purchase of any extra land, and it is very necessary that the works should be enlarged to meet the increasing requirements of the neighbourhood. I do not believe the compulsory purchase of the gas company would be advantageous, because, in my opinion, the management would not be so good as it is. The profits accruing would also, I presume, be applied in reducing the highway and other rates, and how far that would operate is a matter of conjecture. With regard to the position of the works, all the property, with the exception of two streets, has come to the works. I have never heard of any complaint from the corporation, or any request that the works should be removed. If the corporation were to buy the property, and erect extra works, if their statement is true, there must be an increased nuisance. There have been considerable alterations in the works during the last few years; there are always improvements going on in the mode of manufacturing gas, and these we have availed ourselves of at different times. We cannot meet the requirements of the neighbourhood unless we acquire the additional land, marked No. 4. The cottages around our works are worth about £8 or £12 a year, and many of them are of recent construction. The sight we propose to take is the only eligible land available. We would rather have had a green field, but it is not there. I have not heard that anybody has objected to our proposed No. 4 site. The allegation in the petition of the corporation, that our application is in consequence of their action, is not true, because the matter was talked about two years ago, and our lawyer was consulted about the matter, and also an engineer from Leeds, whose name, I think, was Arnott.

Cross-examined by Mr. MICHAEL: Strictly speaking, if the maximum dividend is guaranteed to the shareholders, they would have no further interest in the concern; but we are desirous of retaining the works in our own hands, because we believe they cannot be so well managed as they are at present.

Mr. MICHAEL: Will you turn to the accounts of profit and loss for the year 1875, and tell me the amount of profit in that year?

Witness: The sum was £1425, and the amount of capital on which we had to pay 10 per cent. that year was about £45,000, which would require £4500.

Mr. MICHAEL: It is clear from your accounts you only made a profit of £1425, which would leave a deficiency of over £3000. Would it not have been a benefit to the shareholders, at least in that year, that instead of having the loss of £3000, you should have had the guaranteed dividend?

Witness: In that case it would have been all the better, evidently. The guaranteed dividend, looking at it from a shareholders point of view, is certainly better, but it is not beneficial in other ways.

Mr. MICHAEL: What other prospective advantage can there be to your company, whatever the amount of future capital you raise?

Witness: Whatever future capital we raise is of no advantage whatever to the present shareholders.

Mr. MICHAEL: Quite so; and as you have to equalize the dividends it is possible that the new capital may not be so productive as the old, and therefore will diminish your dividend; consequently, with every increase of capital under the conditions on which you have raised it, there is a greater prospective possible loss to the shareholders from the increase in the works?

Witness: I do not see that, because we have always gone carefully in our extensions. We have not gone hastily to work until there was some consumption guaranteed, which would realize us at least from 4½ to 5 per cent. profit. We have never taken into account any depreciation of works, and the repairs that have been going on we consider have been equivalent to any depreciation. Some years ago we had a reserve-fund amounting to about £4000, a portion of which was invested in Sheffield and Lincolnshire stock, but we were obliged to sell out in order to expend it upon extensions.

Mr. MICHAEL: Do you think it was competent for you to do that? Do you not know that the Act of Parliament expressly says you shall invest it in Government securities, and allow it to accumulate at compound interest, and not expend it on works?

Witness: I must, of course, plead guilty to the charge that we did not do so. It was expended in extensions, together with a large sum we owed to the bank, and that is one of our reasons for coming to Parliament to raise additional capital.

Mr. MICHAEL: You have exceeded your statutory powers, owing to the necessity for giving an increased supply of gas?

Witness: Exactly; and at the time we undertook it we were not aware the gasholder would have cost so much as it did. There was a great difference between the estimate and the actual cost. I cannot tell the actual amount of unaccounted-for gas, but a great deal of it is owing to the way in which the public lamps are fitted. We have frequently complained to the corporation on the matter, and also because we found they were burning gas at the town-hall without passing it through a meter. At one time I know it was nearly 40 per cent., but that was the time we had the township of Dukinfield to supply, and the enormous amount of colliery workings, and the subsidence of the earth was continually breaking the pipes and causing leakage, and that was one strong reason why we relinquished possession of that district, and handed it over to our neighbours. It is greatly in the interest of the district that some increase should be made in the works. Large mills are being erected in all directions, and there is also an increasing population, and these demands will have to be met. We are constrained to increase our works on their present site because we have no other land, except we go beyond the boundary of the borough. On the ground of economy, we wish to keep the plant together, because less surveillance is necessary. Our gasholders are in different places, because no surveillance is necessary with reference to the storeage of gas.

Mr. MICHAEL (pointing to plan): Will you look at this plan, and tell me whether the site of 3½ acres called Westmill would not be available for the extension of the works.

Witness: It is on the wrong side of the town, and any nuisance that might be caused by the manufacture of gas would go over all the borough of Ashton, extending from east to west. The point we have selected for extension is between two lines of railway, but there is no necessity at present to secure it, because the Earl of Stamford will be glad to come to terms with us for the sale of it when required. We have sufficient at present to last for five or six years, and therefore we do not wish to go on at too rapid a pace. I think the initial pressure we use at the time of greatest consumption—which is between six and seven in the evening—is 3½ inches at the works. I cannot give the committee any idea as to the number of consumers on the last mile of main and the first mile of main from our works. There is a smaller amount of consumption on the last mile, but the thing must be taken as a whole.

Mr. MICHAEL: Here we have two distinct districts, the borough of Ashton, and the Audenshaw Local Board. Does it bring you in as much profit to supply the Audenshaw Local Board district, as it does to supply the borough of Ashton?

Witness: We have not the measure of gas consumed, except through the meter, and of course we cannot take in the leakage, inasmuch as that leakage is measured at the station-meter.

Mr. MICHAEL: Without reference to meters or leakage, or any matters of that kind, can you have as much profit when there is a very much smaller consumption at the end of a main as compared with the main which is close to the works?

Witness: Certainly not.

Mr. MICHAEL: Therefore you are obliged to charge a higher price in the borough of Ashton to make up for the comparatively small profit in the district of Audenshaw?

Witness: I do not see that.

Mr. MICHAEL: If you get 1s. of profit in the borough of Ashton on every 1000 feet of gas, and only 6d. in Audenshaw, is it not a loss to the consumer of every single 1000 feet you supply in Ashton, so far as relates to the supply of gas to him.

Witness: I say, if that argument is to be applied, it would apply equally to the distant parts of the borough itself.

FRIDAY, APRIL 20.

Mr. *Mellor* recalled, and further cross-examined by Mr. MICHAEL.

We have hitherto had no fixed limit with regard to the illuminating power of our gas, but the quality we have supplied has been over 19 candles; we now propose to reduce that to 14.

Re-examined by Mr. GOULDTHORP: The reason our profit was so small in 1875 was owing to the high price of coal. In Ashton we are almost entirely surrounded by coal mines, and the earth is continually subsiding. The mines extend right under the centre of the town, but the coal cannot be got from there, because compensation would have to be paid in every case. I have myself discovered leakages where the earth has sunk something like 6 inches, and broken the joints of the pipes; but the leakage has been very much reduced by the repairs which have taken place in all directions—from 35 to 12½ per cent.

Mr. *J. F. Buckley*, examined by Mr. CRIPPS.

I am one of the directors of the Ashton Gas Company, and have considered the questions raised by the present Bill. My opinion is very strong that the works cannot be removed without saddling the company with expense, and the gas consumers with a considerable increase in price. I do not think there is such a nuisance from the works as would warrant the expense of their removal. Gas-works are always disagreeable, but the companies can be indicted under the Public Health Act if they commit a nuisance. Nothing of the kind has been attempted at Ashton. In my opinion, there are many greater nuisances in the borough than the gas-works. There are many ponds of stagnant water which are used by the cotton mills for condensing, and which get very warm in summer time, and emit most offensive smells, far more prejudicial to health than the smell from gas-works. There is also a depôt for the deposit of night soil within a short distance of the gas-works, on the north side, and from that, at times, the smell is very much worse than I ever knew it to be from the gas-works. In the Bill for the purchase of the works there is no proposition for the purchase of any additional land. I consider our original proposition of 7 per cent. on the additional capital a fair allowance for the risk and trouble of carrying on the business. Compared with other towns, our capital is small in proportion to our make of gas. If our proposal of 7 per cent. were not allowed, but an adequate sliding scale given to us, I think it would be an inducement for us to persevere with our Bill; that is, assuming that the initial price fixed is a fair one.

Cross-examined by Mr. MICHAEL: I cannot say whether the directors have determined what the initial price ought to be. I believe there are precedents for a sliding scale, and no doubt we shall be bound by them. In January, 1876, a resolution was passed by the directors to the effect that the management of the works had been for some time unsatisfactory, upon which the then manager resigned. He had formerly been in the service of the company as accountant, and was promoted manager about 2½ years previously to his retirement. So long as his duties were confined to the manufacture of gas, pure and simple, he gave satisfaction to the board, but when it came to the erection and superintendence of new works, such as those on which we have been spending our capital lately

he found himself not equal to the task. With regard to the amounts expended on the works during the last three years, I feel myself quite responsible for the course which was adopted. In 1876 the sum of £4965 was taken out of the revenue account for depreciation and repair of the works, but £3600 of that amount was written off in consequence of the destruction of two gasholders, after deducting the value of them as old materials. It has been our practice hitherto to charge for depreciation and repairs, not as some companies do, by an annual deduction of so much per cent., but by charging the sums which are actually expended from year to year as they arise. I believe the usual amount written off varies from 7½ to 2½ per cent., according to the various kinds of plant. The length of time a gasholder will last depends on circumstances. We have been in existence as a company for 50 years, and every gasholder that was established then is now destroyed. Since I have been connected with the company, our average charge for depreciation and repairs has been about 4 per cent. In 1876 it was about 9 per cent., but in other years we have only taken 1 or 2 per cent. In the previous year we expended £3770, but in that year also two gasholders were destroyed. In 1873 the same item amounted to £3329; but, although no gasholders were destroyed that year, we replaced other plant. We ought, at least, to take from £2000 to £2500 a year for repairs of the works, if they are to be kept in an efficient state, and I consider we have not repaired them to more than that extent, if several years are taken together.

Cross-examined by Mr. YATES: It does not matter what the dividend is with the auction clauses, but 10 per cent. would simplify our accounts, no doubt.

Re-examined by Mr. CRIPPS: During the year when we charged £3600 against revenue, we also charged £7471 for works against capital, which was twice as much. As a millowner, I manufacture my own gas upon my own premises.

Dr. *W. Gardiner*, examined by Mr. GOULDTHORP.

I am a doctor of medicine at Ashton, and have resided about 100 yards from the gas-works for the last 20 years. I know the district very well; and there are two or three factories in the immediate neighbourhood. From my experience I have not found the gas-works injurious to health. I consider tar to be a valuable antiseptic. There are many other products of combustion which are also antiseptics, such as the tarry particles given off from the combustion of coal, the minute particles of carbon, and likewise the sulphurous acid. The district of Childstown is noted for many very old people, and that is within a radius of 200 yards from the works. From my experience the area of 300 yards from the gas-works will compare very favourably, as regards health, with any equally densely populated town.

Cross-examined by Mr. BROWNE: I know more of that district than the sanitary officer does, and I should be very much surprised to hear that the death-rate there is much higher than in any other part of Ashton. Sulphuretted hydrogen would not be favourable to a proper condition of health, if much concentrated, but the greater portion is absorbed by lime used for the purpose. I have not noticed the paint on the shutters and doors in the immediate vicinity of the gas-works, and, therefore, cannot say whether any change has taken place in consequence of the noxious vapours from the gas-works. I think it would be more satisfactory to have the gas-works a little way from such a dense population. I have not detected any escape of gas from the ground.

Mr. *C. T. Bradbury*, examined by Mr. GOULDTHORP.

I am managing director of the firm of John H. Garside and Co., cotton spinners, &c., at Ashton and also at Dukinfield. At the Wellington Mills, Ashton, we are supplied with gas by the Ashton Gas Company, and during the year ending the 22nd of December last we consumed there 3,441,300 cubic feet. We are decidedly the largest consumers in the district. I have been connected with the Wellington Mills for nearly 3½ years, and during that time the quantity and quality of the gas supplied have been quite satisfactory. I also consider the price to be reasonable. I think it would be a great disadvantage for the works to be in the hands of the corporation. We consume at the Wellington Mills over £600 worth of gas in the year, and the municipal rates we paid last year amounted to £102 3s. 4d.

Mr. BROWNE: I do not see what that has to do with it.

Witness: If the Ashton Corporation make profits to go in reduction of the rates, we should have a reduction on £100, but we should have to pay on £600. At present all the profits which the gas company make above that which is allowed by Act of Parliament have to go in reduction of the price of gas. The corporation, I presume, would buy at the full price—viz., the 10 per cent. which is allowed by Act of Parliament, but then there would be no further restriction upon them; they could make any profit that they were able to make, so long as they did not exceed the maximum price, and kept up the minimum illuminating power. Then, again, I do not think a fluctuating body like the corporation would manage the works so well as the directors who have been connected with it for a long period, and have had more experience in the matter. As regards large and small consumers, I certainly think the large consumers ought to have the greater discount, because there is less leakage in proportion to the quantity supplied, and less cost of mains; and they also increase the total quantity of gas consumed. It is produced at a cheaper rate, because there is a larger quantity; and, moreover, if they did not get the reduction, they would make their own gas.

Cross-examined by Mr. BROWNE: I am aware that it is proposed to transfer the works of the Dukinfield Gas Company to the Dukinfield Local Board, but our firm are opposed to that transfer, and have signed a petition to that effect. I was not aware that the price at Manchester is less than the price at Ashton, but I am aware that in several of the large towns round Ashton the gas-works are in the hands of the corporations. I should not think our mill at Ashton is favourably situated with regard to the supply of gas, because it is nearly on the level of the river on the south side, and therefore low. I have not heard that there have been grave complaints from people on the north side of the river with regard to the supply of gas. The only complaint I have heard was at some distance where the pipes were limited. I did not know that the company propose to take power to supply only 14-candle gas, because that would not be satisfactory to me. I should like to see a higher illuminating power than that. I believe the small consumers in Ashton would benefit more by a reduction of rates than by a reduction in the price of gas, but they would be receiving money out of the pockets of the large consumers.

Mr. BROWNE: Supposing the new capital which the company require of £50,000 could be raised at 4 per cent. instead of 7 per cent., would you not be benefited by the transfer of the works to the corporation?

Witness: Yes, in that respect, if all the profits went to reduce the price of gas.

Mr. BROWNE: Do you not think that it would be more to the advantage of the public that the breaking-up of the streets which is necessary in connexion with gas should be in the hands of the local authority?

Witness: I believe practically that would make no difference from what it is at present, because there would be two departments which would have to communicate with each other, and the company and the corporation can do that now. I am not aware that there have been serious complaints with regard to the way in which the company have broken up the streets.

Mr. BROWNE: You say that a fluctuating body would not be so well qualified to manage a gas concern as a non-fluctuating body. The Government are a fluctuating body, are they not?

Witness: In a sense; but there are permanent officials who have the real management.

Mr. BROWNE: In the case of a gas company there would be permanent officials, and, therefore, although the members of the Town Council might be changed, the gas manager would remain the same?

Witness: In all probability.

Mr. BROWNE: Does it not occur to you as an advantage that the fluctuation which would take place would give the consumer a voice in the management?

Witness: It does not occur to me. Unless they had a special knowledge of gas, I do not see that it would benefit them.

Mr. *J. B. Grundy*, examined by Mr. GOULDTHORP.

I live at Beardsall, about one and three-quarter miles from Ashton, and am a member of the firm of Dodson and Grundy, cotton spinners. I have had six years experience of the gas supply, and with regard both to quality and quantity it has been everything we could desire. Our consumption is 324,000 feet at the mill, and 25,000 at my house. I agree with the previous witness respecting discounts to large consumers.

Cross-examined by Mr. BROWNE: Should the Ashton Corporation acquire the gas-works, I am sure we should have worse gas. I was born and brought up at Oldham, and if I thought we were to have the gas merely as they have it at Oldham, I should certainly want to remove our mill. Not only have they no discounts there, but when the late town-clerk died they immediately raised the price in the Lees district 5d. per 1000 feet. Perhaps I may state that if their largest consumer had his works at Lees instead of at Oldham, he would be paying £1200 per annum in rates to Oldham without receiving one halfpenny benefit. The town-clerk gave his word of honour that he would see the matter put right, and so long as he lived he kept his word, but when he died they would not abide by what he had said. Our mill stands a few feet above the town of Ashton, and in that way we are in a good position for the supply of gas.

Mr. POPE said the promoters had several more consumers as witnesses, but he did not think it was necessary to carry that evidence any further.

Mr. *J. Kelsall*, examined by Mr. POPE.

I am a merchant, carrying on business at Ashton-under-Lyne. Until March, 1873, I was employed in the gas-works, first as clerk, and subsequently as manager in 1865. During the year ending June 30, 1870, our average illuminating power was 19·54 candles; about 17 tests were taken during that year. In 1871 the average of 34 tests was 20·04 candles. In 1872 the average of 68 tests gave 18·9 candles. The gas was tested by the best photometer, and the best mode of testing with which I was acquainted. During the whole time I was manager we had no complaints from the private consumers, but we had from the corporation, with reference to the quality. On one occasion they made the quality appear as low as 14 candles, and I offered to go with the person who made that test on behalf of the corporation to see their photometer and mode of testing, and allow him to see ours, so as to arrive at the cause of the difference, but I was not allowed to do so. I do not know what their testing apparatus was, but I have no doubt that my tests were correct.

Cross-examined by Mr. BROWNE: At one time the corporation complained when we were using nothing but cannel, in consequence of the improper burners some of the consumers employed. I never remember a complaint from the corporation as to the way the works were managed, nor yet as to the way in which the streets were relaid after being broken up. At the time I was appointed manager, the leakage was 30 per cent., but it was reduced to 18 per cent., while I was there. I do not know whether it has risen subsequently. Many of the mains have been laid down a long time—some over 20 years, but I should not think they are in a bad and corroded condition. I used a Bunsen photometer in my tests. I certainly consider 17 tests in a year a very small number, but I did not begin to test at the commencement of the year in that case. I know a piece of land called Walk Mill, but I do not know that it is a better site for the extension of the gas-works than the one selected by the company. We used to test for sulphuretted hydrogen, and whenever it was discovered, we changed the lime-vessels, and the gas had to go through a clean vessel even then. Those tests were taken either two or three times a day.

Mr. *D. Clark*, examined by Mr. POPE.

I am the manager of the Ashton Gas Company, and was appointed in February, 1876. Previous to that time I was for six years manager of the Glossop Gas-Works. The lands of the company consist of three plots. No. 1 plot is occupied by the theatre and concert tavern, the offices of the gas company, and the whole of the plant for manufacturing gas and for the storeage of coal and residual products. Plot No. 2 is occupied by two telescopic gasholders and governor-house, with a capacity for storeage of 400,000 cubic feet. On plot No. 3 there is only one telescopic gasholder, the remainder of the land being vacant. The manufacturing plant of the company consists of two retort-houses, in which are 96 ovens. We have storeage room for about 800 tons of coal. We have engines, condensers, scrubbers, purifying-houses, and all other belongings to a gas-works. Our present production is about 800,000 cubic feet per day, which enables us to keep in reserve about 15 per cent. of our retort power, which I consider a fair reserve. Our purifying apparatus is fully occupied, and upon our present limited space it will not be possible to increase that power in a satisfactory way. We are also cramped for room for coal storeage. Our actual production in the year 1865 was 68,144,000 cubic feet; in 1866, 82,651,000; 1867, 87,060,000; 1868, 99,552,000; 1869, 99,213,000; 1870, 101,758,000; 1871, 110,983,000; 1872, 116,552,000; 1873, 120,773,000; 1874, 124,059,000; 1875, 130,456,000; 1876, 133,633,000. Our power of production of 800,000 cubic feet per day would work out to 150 millions, so that we are very near to our maximum. The actual amount of gas sold in 1876 was 115,758,046 feet, used in offices and works about 1,200,000, leaving unaccounted for 16,674,954, or 12·48 per cent. Our production per ton of coals was 9872 cubic feet, and the quantity sold 8552 cubic feet. The quantity of coal carbonized was 8028 tons 11 cwt., and cannel 5507 tons. The capital employed per ton of coals was £4 8s. 5½d., and the amount per 1000 feet 10s. 4d. The net proceeds of coke and other residuals was 38·77 per cent. The per centage of common coal used was 59·31, and of cannel 40·69, which enabled us to give gas of a high illuminating power. I have also worked out a statement showing the amount of profit upon the manufacture of gas, charging it with all the coals consumed, of which the following is a summary:—

Profit on gas manufacture			£4693 10 7
Add, not included in above—			
Rental of meters	£8 5 6		
Rents	69 0 0		
Weighing	0 18 6		
Fittings	62 6 10		
		140 10 4	
			£4834 0 11
Less income-tax, not included in above			13 10 10
Profit, as per balance-sheet			£4820 10 1

I think we produce a good gas at a moderate price. Our total length of mains is 33 miles, earning a rental of £688 per mile. The district is thoroughly undermined, which causes more or less leakage. The largest quantity of gas produced in 24 hours was on the 21st of December last—751,000 cubic feet; the least was in July—126,000 cubic feet. Our average illuminating power during 1876 was 19·02 candles; the total number of tests being 179. The total number of public lamps we supply is 774, of which the Ashton Corporation own 644, the Audenshaw Local Board 93, and the Hurst Local Board 37. We have contracts with those public bodies to keep the lamps, fittings, and governors in repair, at a cost of 1s. 7d. per annum. The demand for gas is increasing, and to provide for that it is necessary to procure additional land. The site proposed is a convenient one for the purpose, and would enable us to utilize our present works to the greatest possible extent. I have framed an estimate of what additional capital would be required, independently of the land, to outfit the works. It is as follows:—

Retort-house to hold 140 retorts, at £25	£3,500	0	0
182 mouthpieces (including 10 per cent. as reserve), at £17	3,094	0	0
Valves, connexions, &c., for ditto	100	0	0
Coal store	2,500	0	0
Purifiers and revivifying-shed	4,000	0	0
Scrubbers	1,200	0	0
Engines, boilers, and exhausters	1,400	0	0
Meter and house	1,000	0	0
Tar-well, pumps, cisterns, &c.	500	0	0
Condensers	500	0	0
Extension of mains, services, and workshops	6,206	0	0
Gasholder and tank to hold 800,000 feet	16,000	0	0
	£40,000	0	0

Cross-examined by Mr. Michael: We have not now a gasholder on No. 1 site; there was one, but we are going to convert the site of it into storeage for coals. Our tar-tank is situated in the yard, but I cannot state the size exactly. We sell our ammoniacal liquor at the strength of 6°. In the year 1876 we produced about 890 tons, which was purified with oxidizable lime. When we draw the retorts, we wheel out the coke and deposit it in the yard. We throw water on it in the retort-house, but not in the yard. I am not aware of any nuisance during the changing of the purifiers; we never had a complaint. The gasholder which was destroyed had been erected nearly 30 years. That on No. 2 site has been erected about 20 years. There is nothing exceptional in the atmosphere of Ashton to make a gasholder wear out in a shorter time than the average, which, in my opinion, is 30 years. We have other gasholders which have been erected 12 years, and they are in pretty fair condition. We have ample retort power at present, although we have not absolutely the power of production equal to our greatest daily demand, and have to draw upon our stock. During the last week we distributed exactly the same quantity as we manufactured. I estimated the mean price of gas to private consumers in 1876 to be 47·09d. per 1000, and the total mean price 47·36d. I arrived at that by taking the total quantity at the various prices and working that out, and then dividing the total quantity supplied. That left a profit of 9·73d. per 1000, which is the amount of money with which to pay our 10 per cent. dividend. We require somewhere about 9d. to pay that dividend.

Mr. Michael: But you did earn 9¾, and therefore you had ¾ per cent. in excess to go to a reserve-fund. You also spent 11·10d. per cent. in the repair of works in that year, and therefore you earned enough to pay 20 per cent., leaving 2d. per 1000 for repairs of works, which I venture to say is ample.

Witness: I think we acted perfectly right, because there were exceptional circumstances in that year. There was a certain sum taken off for destruction of plant, which had not been taken off every year for the simple reason that it had been renewed, and consequently paid for at the time. I do not see anything unreasonable in writing off £3600 in one item. [Witness was cross-examined at some length as to the removal of the old and disused gasholders during the last four or five years.] I do not know that it is altogether essential to charge income year by year with a certain amount calculated over the whole, and representing the life of the works.

Mr. Michael: Supposing the amount of profit in the last year had been £4900, and the directors had chosen to write off £4900, would you not have thought it very hard upon you, in your first year of office, that it should be represented that you had so conducted the works that not a single halfpenny of profit had been given to the shareholders?

Witness: In that case I should.

Mr. Michael: What is the difference, because you have an excess of double that sum, and you have to pay your 10 per cent., and then you crowd into one year £5000 for repairs?

Witness: Because we are able to do it.

Re-examined by Mr. Gouldthorp: It is the custom in Lancashire, instead of taking the average over a number of years, to put it down as we have done in this case.

By the Referee: The average price for coal and cannel during the year 1876 was 18s. 5·33d. per ton. Our object in putting 14 candles into our Bill was not with the intention of carrying it out, because it would require something like 16 candles to keep it above the standard. If 16 is more satisfactory to the committee, we will insert it.

Mr. *G. W. Stevenson*, C.E., examined by Mr. Cripps.

I have perused both the Bill of the company, and also the petition of the corporation against it, and I have visited Ashton specially with reference to this inquiry. The books show that the growth of the company's business for the last 20 years has been at the rate of 9 per cent. per annum. The company are now seriously inconvenienced from the want of more space in which to conduct their manufacturing operations. They must also have more capital if they are to fulfil their obligations to the public. When a company have a prosperous career like this, when their business grows at the rate this company's has done, an amount of capital is asked for which will last from 10 to 15 years. The £50,000 proposed by the present Bill will be quite exhausted, I should think, in 15 years. It is a very reasonable sum to ask for, and, judging by past experience of the company's operations, I think they may be safely entrusted with even more than the usual sum. The present invested capital is very small in proportion to the work done. The capital employed is £4 8s. 6d. per ton of coal carbonized, and 10s. 6d. per 1000 feet of gas sold, and, with some half dozen exceptions, perhaps, that is the smallest amount of capital employed, for the amount of business done, throughout the kingdom. The smaller the amount of capital, the smaller the sum per 1000 feet required for dividend, and, therefore, the cheaper the gas can be sold. The average of the London companies per ton of coal carbonized is £7 6s. 3d., and per 1000 feet sold, 16s. 2d. At the present moment there is not one of the London companies who have so small an amount of capital for their business as the Ashton Gas Company. The structural value of the whole of the works and distributing apparatus exceeds £8000. That sum is very much larger than is represented by the nominal capital of the company, showing that a very much larger amount has been taken into the concern, either from premiums obtained by the sale of shares, or the application of what is called the renewal-fund to the restoration of the fabric. As a consequence of that, only 10d. per 1000 feet is required to pay a dividend of 10 per cent., against 14½d. in the case of the London companies. The yield of gas also compares favourably with that of other companies. Mr. Clarke gave the figures of 9872 cubic feet per ton made, and 8552 feet per ton sold, the unaccounted-for gas being 13·37 per cent. on the gross; but, deducting the quantity used on the works, it brings out about 12½ per cent., and that would be very much reduced if the town were not undermined, causing the mains to be constantly fractured. The general working expenses of the company are also unusually moderate. If the sum spent upon renewals be excluded, the working expenses are less than 1s. per 1000 feet, the average of the London companies being 16½d. I expect wages are somewhat higher in London than they are in Ashton, although they are not materially different. Including renewals, the working expenses would be 1s. 9½d. per 1000 feet; but it is not the practice in London to ask anything for renewals. I have visited a great many gas-works, and I do not think there is any company in the kingdom conducting their business better than the Ashton Gas Company, and only a limited number doing as well. It is simply impossible that the corporation could carry the business on better than the company. The great evil of corporate management is the changing body, and the want of continuity of direction. The Gas Committee of a corporation are changed every year, and frequently the chairman of a committee is not a continuing member of the direction. The policy which is inaugurated one year is upset the next; but that is not so when a company manage a trading concern, in which the directors have the largest stake. I have made out a table in reference to the gas-works in Lancashire and neighbourhood which belong to the local authorities.

The following table was handed in:—

Gas-Works belonging to Local Authorities, mostly in Lancashire.

Name of Town.	Quantity of Gas produced per Annum. Cubic Feet.	Net Present Price of Gas within the Borough.	Net Present Price of Gas without the Borough.	Invested Capital.	Invested Capital per 1000 Feet Made.
Barrow-in-Furness	95,000,000	5/.	5/.	66,966	14/1
Blackpool	35,000,000	4/2	4/2	20,000	11/5
Bolton	400,000,000	3/6	4/3—4/.	264,633	13/3
Burnley	150,000,000	3/.	4/.	100,000	13/4
Bury (Lanc.)	145,000,000	3/9	5/9	91,592	12/8
Halifax	276,000,000	3/4½—3/2½	4/10½—4/8	233,524	16/11
Heywood	60,000,000	4/2	5/7	46,000	15/4
Macclesfield	90,000,000	4/.	4/.	70,898	15/9
Manchester	1,972,696,000	3/4	3/10	742,560	7/7
Middleton	60,000,000	4/1	4/1	33,050	11/.
Oldham	450,000,000	3/8	4/.	278,229	12/5
Rochdale	240,000,000	4/2—3/11	4/10—4/7	106,000	12/2
Salford	580,000,000	4/.—3/11	5/.—4/8	339,374	11/8
Southport	130,000,000	4/.	4/.	100,000	15/5
Stockton	208,000,000	4/.—3/10	4/8—4/.	89,926	8/8
Widnes	63,000,000	4/6	4/6	45,000	14/3
Ashton	133,633,000	3/8—3/2	3/8—3/2	60,000	9/.

Taking the invested capital per 1000 feet, Ashton is the lowest, with the exception of Stockport and Manchester, and it is well known that at Manchester the corporation write off a large sum every year for depreciation, and really write it off their capital, and in that way the amount of the capital is kept down in relation to the business done. They take the amount of money standing to the capital account at the end of the year, and they add that to the amount of money spent on capital account during the year, and then they deduct 2 per cent. on structural capital from the whole amount, and the balance represents the capital invested in the concern at that time. That is done year by year, and they do the same thing at Walsall. There is no reason assigned in the preamble of the corporation Bill, and no reason assigned in the petition, beyond that of general expediency, why they should be permitted to purchase. If this company had been guilty of negligence or wrong-doing, in regard to the supply of gas to their consumers, I should not have been a witness, because when a gas or water company misconduct themselves I say their affairs ought to be transferred to the local authority. There have been only two cases of compulsory purchase—the Rotherham Gas Company and the Stockton and Middlesbrough Water Company, and, in those cases, very grievous allegations were made and established against both companies. The Corporation of Ashton state in their petition that the situation of the gas-works, as regards the town, is very objectionable, but they ask the committee to give them power to buy the undertaking, and allow them to perpetuate that nuisance, if it be one. There is no suggestion of going elsewhere. I am quite prepared to say that, if entirely new works were to be erected in Ashton, the present site is not one I should recommend; but, the works being erected, there is no valid reason for removing them. The south-western wind is the one which prevails there, and, whatever smell there may be, is carried into the country immediately. The property in the neighbourhood is now of a very valuable character, and the works are extremely well conducted. There is as little disagreeable smell from these gas-works as it is possible to have. There have not been many cases since 1865 in which the auction clauses have been introduced—not more than 20. With reference to the new capital sought to be raised at 7 per cent., I do not see why the restriction of selling by auction should be continued. The auction clauses are very properly applicable to companies having an exaggerated capital according to the amount of business they do; but this company manage their affairs so well, that I do not see why those clauses should not be abandoned. That has been done in the case of the Sunderland Water Bill, and also in a gas Bill, the name of which I have forgotten. If a gas company have a capital exceeding 15s. per 1000 feet, then it is very fair to say that the auction clauses ought to be introduced with a view of bringing the capital down in relation to the amount of business they do. I know very well that in recent legislation the auction clauses have been mixed up and taken together with the sliding scale, as was the case with the metropolitan companies last year, and that is a case of mutual benefit, because it might enable, after a time, the sliding scale to operate more favourably to the company, while it also operated more favourably to the consumer. I think I brought the sliding scale under the notice of the Board of Trade, and before the committee who had charge of the metropolitan gas Bills of last year. Of course, I am assuming that the sliding scale is given with reference to a fair fixed initial price. With an unfair initial price it might be made unfair, either to the company or to the consumer. I should consider it an unfair thing if the auction clauses, without the sliding scale, were put into a Bill of this kind. Without the sliding scale there is no inducement to a company having auction clauses to conduct their business with economy. The Ashton Gas Company ought certainly to remove their purifiers, and all their condensing and revivifying apparatus, to the new station they are proposing to acquire, and then they would have more yard room for the storeage of coke, and be able to conduct their business more economically. I am sure they cannot carry on their business successfully and properly without more land and more capital.

MONDAY, APRIL 23.

Mr. CRIPPS intimated to the committee that, if the Bill of the company were passed, they would introduce auction clauses and the sliding scale.

Mr. BROWNE said that, with or without those clauses, the corporation would oppose the Bill out and out.

The CHAIRMAN said that being the position, the question of price had better be entered upon at once.

Mr. *Stevenson* recalled, and further examined by Mr. CRIPPS.

Assuming a sliding scale to be adopted by the Ashton Gas Company, I have made some calculations as to what would be a fair initial price to start from. According to figures furnished by Mr. Clark, the net cost of coal last year was 1s. 3·85d. per 1000 feet, and the total working expenses 21·51d., but that latter item also includes a sum which was carried from profits to renewals, and which ought to have been separately stated. I, therefore, propose to reduce that 21·51d. to 18d.

The REFEREE: Including cost of coal, and repairs and maintenance?

Witness: No; excluding coal. Take first of all 1s. 3·85d. net cost of raw material, and then add 18d. for working expenses, and 10d. for dividends.

By the CHAIRMAN: To make the 10 per cent. dividend upon their present authorized and expended capital. We are endeavouring to arrive at what the standard price of gas should be at the present moment, quite irrespective of the future, and of any future expenditure of capital.

Examination resumed: The future expenditure is supposed to produce its own revenue and its own profit. Those figures give us 43·85d., or, practically, 3s. 8d. per 1000 feet. It is a question whether last year's working should be taken as a fair record of what the standard price should be, because coal was low in price, and the company may not be able next year to make their 10d. for dividend with a price of 3s. 8d. It is just a question whether another penny should not be given, and the standard fixed at 3s. 9d. The standard price of The Gaslight and Coke Company, who supply two-thirds or three-fourths of the Metropolis, is 3s. 9d. but that of the South Metropolitan—a small company on the south of the Thames—is 3s. 6d. The whole of the new capital of those companies is entitled to 10 per cent., but it is to be raised by means of the auction clauses.

Mr. CRIPPS: Prospectively the London companies would be getting a larger amount relatively to the basis of the past, because they had not the auction clauses hitherto, but we have; and, therefore, our capital has been diminished by the auction clauses, while theirs has not?

Witness: Yes.

Mr. CRIPPS: Therefore, the new capital raised in a different way will tell more in favour of the London companies than it could for us?

Witness: Yes. There is no doubt the price of coal at Ashton is very much cheaper than in London, but, in the same degree, coke sells for a very little money. The value of coke is always in inverse ratio to the price of coal. What is to be looked to in the price of coal is not the gross but the net—that is, after the coke and other residual products have been sold. The consumption in London per mile of main is very much larger than it could possibly be with the Ashton Company. I should think one mile of main in the densest part of the Metropolis—say the Strand, for instance—would give as much revenue as the whole 33 miles of this company. As the mains are extended there are all the extra expenses of the leakage, and matters of that kind, to consider.

Cross-examined by Mr. MICHAEL: I am not a believer in large discounts, although I am in small ones. I do not know whether, under the sliding scale, the company propose to abolish the system of discounts. The sliding scale will work very well, if the company give fair discounts, for two things—supply of gas through large service-pipes, by which they save unaccounted-for gas, and security for payment.

Mr. MICHAEL: How are you going to estimate the price? Taking your initial price of 3s. 8d., there will be persons who will be charged 2s. 8d., if the existing system of discounts is continued. How, then, is the sliding scale to operate?

Witness: I presume it will be upon the average of the whole. The whole of the gas sold and the total revenue derived will be taken and divided one into the other.

Mr. MICHAEL: How is that to be done? I am a supposed consumer, and I burn in such a way that I have no discount whatever, and I pay you 3s. 8d. initial price?

Witness: That will all be ascertainable under the form of accounts prescribed by the Act of 1871; but 6d. is absolutely allowed to everybody for prompt payment.

Mr. MICHAEL: No small consumer of gas would know what was the price charged for gas over the whole district?

Witness: He would, if he had those annual accounts in his hand.

Mr. MICHAEL: Do you mean that a shoemaker, burning 5000 or 6000 feet of gas, would be able to go through those complicated accounts and find the mean price?

Witness: Do you think it important that he should?

Mr. MICHAEL: It is very important with respect to the dividend to be paid according to the sliding scale?

Witness: It is very important, for those who represent the interest of the corporation, that they should be able to ascertain whether the company are dividing their proper rate of dividend according to the price they charge for gas; and the accounts are so straightforward that it is utterly impossible the borough accountant could fail to understand them, and to advise his employers whether the company were doing right or wrong. I am not prepared to say what difference ought to be made in the discounts between the large and small consumers, but I should have thought a reducing scale to the largest consumer of 3d. would have met the question. I do not approve of the principle that, however sparse the population, the price should be equalized over the whole district, but I do not think that the borough boundary should be the line of demarcation. I think the radius would be the proper mode. I do not like to confuse the two items "repairs" and "renewals." Repairs ought to be done year by year before a division of profits out of revenue; renewals should be done by setting aside a certain sum annually to reproduce the cost of the original article at the expiration of its life. I presume the Ashton Company have done the right thing in the wrong way. They have let the matter of the renewal or depreciation fund go by, and when the necessity for renewing a worn-out piece of their plant has arisen, they have taken the amount out of profits (which they were happily able to do) in one, two, or three years, instead of spreading it over 10, 15, 20, or 30 years.

Mr. MICHAEL: In 1876 a sum of £5400, in round numbers, was expended in repairs and renewals; but if that were abstracted, the company might have paid their dividends, and then only have charged 36·26d. for their gas?

Witness: On the contrary, if we had not expended that amount we should not have been able to supply gas at all. Ever since 1872 the company have been renewing their plant, and they have spent about £17,000 on those renewals. They have exhausted their profits, and have also carried profits to capital account, for the purpose of replacing destroyed plant. That is quite at variance with the plan adopted in London, because at the present time the works of the Chartered Company at Brick Lane, Curtain Road, and Blackfriars have been abolished, and yet the whole of the capital represented by those places is receiving dividend from the consumer, and I think most unjustly. With regard to the alternative site of 8½ acres which has been mentioned, I do not think it at all advantageous because the noxious vapours would be carried directly over the whole of the town. There are some advantages in gas-works being in the hands of corporations, one of which is that the controlling body has also the command of the streets. Generally also the corporations are amongst the largest consumers of gas for public lighting purposes, but I do not know whether it is so here; I expect some of the millowners are quite as large. There is also another reason—there is less grumbling. It is no use grumbling at the corporation, but a company are always fair game for consumers to grumble at.

Mr. MICHAEL: Is it not better to have a maximum dividend guaranteed upon the whole of the property of the borough, rather than a fluctuating and possibly diminished dividend, which would accrue from the conduct of a commercial enterprise?

Witness: All things being equal, it would be so, but in this case there is no possibility of the dividend of the company being in jeopardy; it is practically safe.

Mr. MICHAEL: Then the works have such a reserve-fund of profit that, whatever the price of coal may be, the dividend is secure?

Witness: No; there is no reserve-fund; that has been abolished and applied to capital.

Mr. MICHAEL: What per centage do you think fair to take out of the revenue of a company to meet the expenses of depreciation, repairs, and renewals?

Witness: One per cent. on the structural value over the whole of the plant—that is for repairs, not renewals.

The CHAIRMAN: I wish you would clear up this point.

Mr. MICHAEL: There was a sum of £5400 taken for repairs and renewals in 1876, and the same item for the ten previous years amounts to £27,000, which represents 5 per cent. on the capital. I wish to show that that is in excess of what it should have been, and how it enures to the injury of the gas consumer; and also how it will bear upon the subsequent question of the initial price to be fixed in the Bill if the sliding scale is adopted.

The CHAIRMAN: It appears to me that one of the great sources of embarrassment is that this company have mixed up their affairs.

Cross-examination resumed: The per centage for renewals must depend upon the requirements of the structure year by year, and also upon the number of million feet turned out. In the present case I should reckon for retorts the company would require 4d. per 1000 feet; for the general structures about the works, perhaps 1½d. per 1000 feet; for mains, services, and meters, another 2d. per 1000 feet, making 7½d. In the company's accounts those items are not charged sufficiently, and that is one reason why every now and then they have to make such large claims for renewals. They do not keep up the stock properly, and cannot do so for the money.

The CHAIRMAN: You know the amount of business of the company, tell us how much a year ought to be the average for repairs?

[The profit and loss accounts for the ten years from 1867 to 1876 were here handed in.]

Witness: Assuming a rental of £22,712, £3600 ought to be taken for repairs.

Mr. MICHAEL: You have no power under the Gas-Works Clauses Act to make depreciation-funds?

Witness: No, nor under any other Act. Under the Companies Clauses Act, there is a contingency-fund, but that is not a renewal-fund.

By the CHAIRMAN: The 1 per cent. for renewals is only upon the structural value of the works, and is arrived at in this way: We will say the life of a gasholder is 25 years; of a meter 10 years; of a main-pipe 50 years; of a tank 80 years, and so on. All these worked out in the form of a sinking-fund, to replace the original structure at the expiration of the life of each thing, works out to about 1 per cent. on the structural value.

Mr. MICHAEL: Is it not the fact, in large companies conducted on a proper principle, that 1 per cent. covers the repairs, and that 2 per cent. covers renewals and repairs?

Witness: I have never looked at it in that way.

Mr. MICHAEL: Two per cent. would work out about £1200 a year, and you have been taking £5000 a year without calculating compound interest?

Witness: I do not follow you.

Mr. MICHAEL: Under the Gas-Works Clauses Act, if you have any excess of profits more than sufficient to pay your maximum dividend, the surplus goes in reduction of price?

Witness: It goes first of all to the formation of a reserve-fund.

Mr. MICHAEL: I am supposing the reserve-fund to be full; ought not the amount of surplus profit in the following year to go in reduction of price?

Witness: Yes. I have said there is no power in any general Act to set aside a sum annually for a renewal or depreciation fund; but the Companies Clauses Act does give power to set aside a sum for contingencies, and does not say how much or how little should be set aside.

Mr. MICHAEL: But you know that does not apply in the case of a gas company, because that contingency is swallowed up in the reserve-fund.

Witness: I have never known that.

Mr. MICHAEL: But is it not the fact that the contingency-fund was for almost expressly the same purpose as the reserve-fund?

Witness: I think it was quite the contrary.

Cross-examined by Mr. YATES: I have never suggested any other price than 3s. 8d. over the whole of the company's district, supposing that to be the standard price. The difference in the cost of supply would be very small between the different points of the district. We could not supply the town at present at a cheaper rate than 3s. 8d.; but as the company's operations increase, they may hope to supply it lower; and, certainly, if a standard price and a sliding scale be put upon them, they will use their best exertions to get the price reduced and the dividends increased.

Re-examined by Mr. CRIPPS: There must be an imaginary line drawn somewhere if a differential rate of price is made, and that would cause a grievance. Supposing the customers are very far apart, then companies generally make a differential charge; but that is not the case at Ashton. I conceive that, as a fact, gas companies have power to form a reserve-fund and a contingency-fund, but as a fact they do not usually create the latter. The London companies have an insurance-fund in addition to their reserve-fund.

Mr. CRIPPS: And if the contingency and reserve-funds are full, then, by law, the balance must be carried to profit and loss account of the next year—in other words, to aid the consumer?

Witness: Yes; and the operation of that clause prohibits companies paying back dividends, unless the latter are put in before it.

Sir E. BECKETT: As a matter of fact, both are not usually put in together.

Mr. CRIPPS: This company, at any rate, have neither a contingency nor a reserve fund, and, therefore, if they have spent a portion of their profits upon renewals, they have taken that from the sum which might have been a guarantee-fund for their dividend, and that has been directly against their interest, and to the interests of the public?

Witness: Yes. The money was spent in replacing worn-out plant, and I am advising the Colchester Company to do just the same; one-third of the whole of their expenditure is being taken out of the profits instead of out of capital, because it is to replace worn-out and disused plant. They

are doing that year by year, and not suddenly, as this company have done. There are many local circumstances which affect the amount of repairs a company may have to do at a particular place, particularly if there are mines and underground works which disturb the surface. At Ashton, not a week passes without their having fractured mains.

Mr. CRIPPS: In considering the question of whether in any particular place it is desirable that the corporation should purchase the works, would not the case very mainly depend upon whether the works, when purchased, were such works as would supply the corporation only, or whether they would include any large area besides?

Witness: If you mean that the works of this company are only sufficient for the supply of the borough, and that the consequence of the works passing into the hands of the corporation would be that, eventually, those works would be entirely required for the borough, and that the outlying districts would have to provide works of their own, I think that would be the case. If the works of the gas company were confined to the municipal boundary, the corporation could acquire the undertaking under the Public Health Act of last session, without coming to Parliament at all. As regards the discounts, there is nothing which would necessarily affect the question of ascertaining how the sliding scale would apply. The average price will be worked out, and that will show whether the company are charging more or less than 3s. 8d., or whatever the standard price may be. The discount is simply given for prompt payment within a certain time.

By the CHAIRMAN: Labour is rather cheaper in Lancashire than in London, and so is coal; but they do not get so good a price for their residuals, so the net cost of the raw material is greater in Lancashire than in London. I would prefer to make and sell gas as a profitable thing in London rather than in Lancashire, especially in a mining district.

By Sir E. BECKETT: I should think the price of gas coal in London at the present time would be about 14s. 6d. per ton, delivered.

The REFEREE: Taking a company of this size with £50,000 capital, and an income of £5000 per year, what amount would you set aside for the contingency-fund or the reserve-fund you mentioned just now?

Witness: I have never been in the habit of advising companies to set aside a contingency-fund at all, but to wait till the contingency arises. I think if works are fully kept in repair there ought not to be any necessity for such a fund. A contingency-fund appears to me to come in appropriately where an accident occurs, such as the Wood Street fire or the Leicester Square explosion, or something of that kind, which cannot be guarded against.

Mr. *J. Holmes*, examined by Mr. GOULDTHORP.

I am a member of the firm of Fletcher, Andrew, and Holmes, land surveyors and valuers at Ashton. I have been intimately acquainted with the district for over 20 years. I have prepared a plan showing the boundary of the borough, and the limits of the Ashton Gas Company. The acreage within the borough of Ashton is 1373 acres, the population 32,000, and the rateable value £107,274. The district outside the borough but within the company's limits is 2333 acres, the population 16,255, and the rateable value £48,000. There is also another district outside the borough, within the company's limit of supply, but not yet supplied with gas, of 4881 acres, population 11,759, and rateable value £43,000. With the exception of a small piece of land to the south-east of the borough, there are practically no sites in the borough suitable for large manufacturing works. The principal area of open land lies on the western and easterly sides of the town, but the westerly side is not suitable for building purposes, owing to its being of a mossy or peaty nature. The districts which have been hitherto unsupplied are being developed very rapidly. I know the neighbourhood of the gas-works, and during the last 20 years there has been a considerable amount of building going on there. I should certainly say that the gas-works have not had any appreciable effect upon those buildings. The land proposed to be acquired by the company is a foundry, with the exception of a small piece on which stand two cottages. It is the most suitable piece of land which could be taken for the extension. I consider the site adjoining No. 3 plot—the one suggested by the corporation—one of the most unsuitable that could be selected as a site for manufacturing gas within the borough. I have seen the petition of the owners and occupiers of Ashton against the gas company's Bill. That petition was signed by 38 persons out of 1700 on whom we had served notices. I have never heard of any nuisance arising from the gas-works.

Cross-examined by Sir E. BECKETT: There are many smells near to Ashton Gas-Works which are far worse than that from the works themselves. As a rule, it is better to have gas-works as low as possible. [Witness was cross-examined at some length as to the description of property situated within the 300 yards radius.]

Mr. CRIPPS said that was the case for the Ashton-under-Lyne Gas Company.

Sir E. BECKETT said he would open the case on behalf of the Ashton-under-Lyne Improvement Bill by calling his witnesses first.

(*To be continued.*)

Legal Intelligence.

HOUSE OF LORDS.—TUESDAY, MAY 1.

PATTERSON *v.* THE GASLIGHT AND COKE COMPANY.

Petitions of the appellent, for leave to sue *in formâ pauperis*, and to allow the printed documents used in evidence in the Courts below to be used on the argument of the appeal at the bar, were read and referred to the Appeal Committee.

HIGHGATE POLICE COURT.—WEDNESDAY, MAY 2.

ALLEGED EMBEZZLEMENT BY THE ASSISTANT SECRETARY OF THE COLNEY HATCH GAS COMPANY.

The adjourned examination of *William Henry Wood* took place this day, the charge against him being that of embezzling more than £900, the property of the company, in whose service he was.

Mr. CROOME prosecuted, and Mr. GRAIN defended.

The evidence against the prisoner was completed, and he was fully committed for trial at the Central Criminal Court.

The prisoner was then charged with obtaining from Mr. R. Higdon the sum of £463 by fraud. The prosecutor stated that he was a baker at 185, Bishopsgate Street Without. He had known the prisoner for years, and had some dealings with him with regard to gas shares. In September last the prisoner induced him to buy 45 shares of the Colney Hatch Gas Company for £463 12s. 3d., and received that amount from him. Prosecutor had not received the shares, nor had the money been returned.

James Dantizer, chief clerk to Messrs. Mortimer and Sons, stockbrokers, said that in September last the firm had 150 shares to sell for a lunatic. He was introduced to the prisoner, and had some conversation with him respecting the sale of the shares. His offer not being high enough, witness did not sell them to him. The firm afterwards sold them.

Evidence was then given, showing that the prosecutor's bank notes were changed at the Bank of England for gold, and for that gold a draught on the Bank of New Zealand for £450.

A formal remand took place until Saturday, when, the evidence being completed, the prisoner was committed for trial on this charge also.

Miscellaneous News.

CORPORATION OF SALFORD.

ABSTRACT OF GAS-FUND ACCOUNTS.

Dr.—Gas-Fund, from June 30, 1875, to June 30, 1876.

To Balance at June 30, 1875			£39,417 10 8
REVENUE ACCOUNT.			
Gas sold, and hire of meters			96,303 12 4
Gas for street-lamps			7,459 13 5
Lighting, &c., lamps			552 0 0
Residuary products—			
Coke sold for cash			3,471 9 3
Ditto on credit			2,416 0 9
Tar			7,434 6 8
Ammonia water			4,187 13 1
Carbon			8 5 0
Old iron sold			657 3 10
Lamp-pillars, &c.			613 7 11
Sundries			46 18 4
CAPITAL ACCOUNT.			
No. 1 station—			
Service-pipes, accounts charged			403 16 8
No. 2 station—			
London and North-Western Railway Company—Moiety of cost of Egerton Street bridge			170 13 3
Loans received			31,695 0 0
			£194,837 11 2

Cr.—Gas-Fund.

REVENUE ACCOUNT.			
By Salaries, poundage, and wages—			
Proportion of Borough Treasurer's Department			£600 0 0
Analytical chemist, R. A Smith			£50 0 0
Manager			520 16 8
Deputy-manager			260 0 0
Outdoor superintendent			190 0 0
Collectors			1,418 7 11
Wages of workmen, including clerks, &c.			18,402 9 8
Cannel			64,462 0 5
Coal			4,701 4 4
Purifying materials—			
Lime			140 14 0
Oxide of iron			720 8 0
Fire-bricks and clay			1,618 17 11
Retorts			1,507 15 3
Ironwork and castings			599 7 8
Tow, rope, oil, paint, &c.			110 14 7
Tools, implements, repairs, &c.			496 10 0
Horse and cart hire			68 5 9
Water			368 4 9
Provender and farriery			183 0 9
Printing, stationery, account books, and advertising			271 4 2
Interest on mortgages			11,814 6 9
Ditto gas deposits			41 13 7
Ditto bank interest			255 17 3
Compensation—			
Re Nolan			118 13 7
Two houses, West Street			12 10 0
Miscellaneous—			
Stamps and sundries			183 0 3
Clothing for inspectors			34 6 0
Travelling expenses			133 16 4
Cab hire			83 12 3
Carting and carriage			37 6 5
Cleaning materials			23 6 0
Writing collecting books			14 9 2
Loan—Procuration fees and stamping mortgages			48 5 4
Insurance, steam-boilers			10 18 6
Rents—			
Rent of telegraph			27 8 4
Expenses of siding, No. 2 station			18 6 3
Chief rent, No. 1 station	£284 1 8		
Less repayable by Salford Town-Hall Committee	103 8 4		
			180 13 4
Rates			3,269 0 1
Property-tax			46 6 0
Salford township-fund—Annuity to June 30, 1876			2,530 0 0
Annual contributions—			
Sinking-fund			6,545 16 6
Depreciation-fund (general)			720 13 6
Ditto (hired meter)			310 3 10
CAPITAL ACCOUNT.			
No. 1 station—			
Wages of workmen			2,508 16 1
Iron mains			4,461 11 7
Lead piping			51 10 6
Repairing streets			306 14 3
Horse and cart hire			126 17 6
Oil, paint, and sundries			67 15 6
Tools and implements			38 10 6
Timber			9 3 8
Horse			76 0 0
Meters			2,713 0 9
No. 2 station—			
Wages of workmen			214 8 10
Ironwork			578 4 2
Oil, paint, &c.			0 13 0
No. 3 station—			
Ironwork			276 6 5
Implements and sundries			124 5 2
Fire-bricks and retorts			895 4 8
Brickwork			40 0 0
Timber, &c.			7 0 7
Paving			61 8 10
Carriage and cartage			38 1 11
Oil, paint, &c.			0 11 5
Loans repaid			5,900 0 0
Balance at June 30, 1876			53,190 15 3
			£194,837 11 2

Dr.—Depreciation-Fund (Hired Meters).

To Balance at June 30, 1875	£7,456 6 8
Interest allowed by bankers, less commission	238 4 3
Revenue account—One year's contributions	310 3 10
	£8,004 14 9

Cr.—Depreciation-Fund (Hired Meters).

By Meters—Altering and stamping	£10 18 10
Wages of workmen	78 16 10
Amount paid out of capital account for meters purchased to replace others broken up	423 2 0
Balance at June 30, 1876—	
Balance in bank	7,994 8 9
Owing to revenue account	502 11 8
	£8,004 14 9

Dr.—Depreciation-Fund (Works and Plant).

(Under the 413th Clause of the Salford Improvement Act, 1862.)

To Balance at June 30, 1875	£14,030	14	10
Interest allowed by bankers	363	16	11
Revenue account—Contribution	720	13	0
	£15,115	4	9

Cr.—Depreciation-Fund (Works and Plant).

By Wages of workmen	£3,024	6	1
Materials	8,359	4	3
Balance at June 30, 1876—			
Balance in bank	9,623	2	6
Due to revenue account	5,891	8	1
	£15,115	4	9

Dr.—Sinking-Fund.

(Under the Provisions of the Salford Improvement Acts, 1862–67.)

To Balance at June 30, 1875	£7,732	17	2
Interest allowed by bankers	75	7	7
Revenue account—One year's contribution to June 30, 1876	6,545	16	6
	£14,354	1	3

Cr.—Sinking-Fund.

By Loans repaid	£5,580	0	0
Balance in the bank	8,774	1	3
	£14,354	1	3

Dr.—Gas-Fund Deposits Account.

To Deposits for security of gas-rents—			
Amount in hand, June 30, 1875	£1,486	13	11
Ditto received since	442	5	6
	£1,928	19	5
Deposits for security of hired meters—			
Amount in hand, June 30, 1875	£3,808	10	2
Ditto received since	1,378	1	6
	£5,186	11	8

Cr.—Gas-Fund Deposits Account.

By Deposits for security of gas-rents—			
Amount repaid during the year	£328	5	1
Balance in hand	1,600	14	4
	£1,928	19	5
Deposits for security of hired meters—			
Amount repaid during the year	£992	16	6
Balance in hand	4,193	15	2
	£5,186	11	8

Dr.—Gas-Fund Stock Account.

Assets.	Outlay, as per last Abstract.	Additions during past Year, as per this Abstract.	Total.
To Works and plant—			
No. 1 station, including mains	£163,813 12 2	£7,243 2 11	£171,056 15 1
No. 2 station, including 13,208 square yards of land, £4126 10s.	63,875 15 9	622 12 9	64,498 8 6
No. 3 station, including 40,799½ square yards of land, £18,400	92,443 11 4	1,442 19 0	93,886 10 4
Gas-meters and fittings on hire	19,245 15 5	2,713 0 9	21,958 16 2
	£339,378 14 8	£12,021 15 5	£351,400 10 1
	Sums Owing to the Council.	Sums Owing by the Council.	
Floating assets, viz. (exclusive of the sinking and depreciation fund balances)—			
Sundry debts and materials on hand, and gas-rents owing	£42,437 17 0	£8,413 12 11	
Hired meter depreciation-fund	502 11 8	..	
Gas-works ditto	5,891 8 1	..	
Deposits for security of gas-rents	..	1,600 14 4	
Ditto hired meters	..	4,193 15 2	
Manchester and Salford Bank	17,700 15 1	..	
Cash due to treasurer	866 5 10	..	
	£67,398 17 8	£14,208 2 5	£53,190 15 3
			£404,591 5 4

Cr.—Gas-Fund Stock Account.

By Mortgages under the Salford Acts, total	£305,391	12	7
Balance, excess of assets	99,199	12	9
	£404,591	5	4

Summary of the Gas-Fund Stock Account.

To Balance brought down	£99,199	12	9
Sinking-fund account	8,774	1	3
Depreciation account—			
Works and plant	3,731	14	5
Hired meters	7,491	17	1
	£119,197	5	6

The gas-fund is chargeable under the Salford Improvement Act, 1862, with an annuity of £2530, payable to the Salford district.

MAURITIUS GAS COMPANY, LIMITED.

The Ordinary General Meeting of Shareholders was held at the London Offices of the Company, Great St. Helen's, on Tuesday, the 1st inst.—W. White, Esq., in the chair.

The Secretary (Mr. A. Hersee) read the following report of the directors and the accounts:—

The directors have the pleasure to submit the audited accounts for the past year, and are able to report a slight improvement in the amount of profit realized.

The number of public street-lamps has remained stationary at 724, owing to the funds of the Municipality not admitting of any addition; but the total of Government and private lights has increased from 4378 to 4559.

The gas and meter rental shows only a nominal advance upon the previous year, and the want of progress in the consumption of gas at Port Louis continues to be a great disappointment to the directors. Trade has not improved so quickly as was expected (consequent upon the improved sugar crop obtained in Mauritus last season), and still remains depressed, which, the manager states, has induced a general economy, and operated against the extended use of gas.

The demand for coke and tar has also been affected by the depression of trade; the prices realized on sales have, however, been satisfactory.

In consequence of favourable arrangements the average cost of coal was greatly reduced during the past year, and it is hoped that a further reduction may be practicable in the current year.

The depreciation in the value of silver has occasioned a heavy loss on remittances, and has seriously diminished the profits. The existing rates of exchange, though less unfavourable than they have been, are such as to cause the directors extreme regret.

The local interests of the company continue to receive the valued supervision of the resident committee, Messrs. H. Adam, M. Connal, and J. A. Ferguson, and the manufacture and distribution of the gas have been satisfactorily conducted by the manager, Mr. Delache.

The general revenue account shows a balance of £1459 5s. 6d., out of which the directors recommend a dividend of 2½ per cent., free of income-tax, payable on the 10th day of May inst.

The retiring director is James Sydney Stopford, Esq., and the retiring auditors are John Robinson Peill, and Thomas Newton Stokes, Esqs., all of whom, being eligible, offer themselves for re-election.

The Chairman, in moving the adoption of the report, said he must, to a great extent, repeat the remarks which he addressed to the shareholders at the last annual meeting. It was some satisfaction to find there was a little improvement again in the affairs of the company, and they were now able to pay a little better dividend while entertaining the reasonable expectation of making further progress in the current year. The effect of the previous bad seasons in Mauritius seemed not yet to have worn off, and the recovery of trade was not yet visible. They must bear in mind, however, that this depression was not confined entirely to Mauritius; it had existed at home and abroad for the last two or three years. The company's manager, whom the directors had repeatedly consulted on the question, did not recommend as a remedy any reduction in the price of gas, and it would be certainly undesirable to sacrifice a portion of the present revenue, unless they were certain to recoup themselves in a very short time. The company, it would be seen, had not stood still, as during the past year they had obtained as many as 637 new lights. The great bulk of the present residents at Port Louis were evidently dispirited with the bad times which had so long prevailed, and were unable or unwilling to make the necessary outlay for the supply of gas. The directors were prepared to deal liberally with consumers in respect of fittings, but still there was a lack of business. A revival of prosperity must surely come some day, and the company might reasonably expect their share in the improvement. Meanwhile, they were languishing for want of an extension of business, for in this, as in all great undertakings, growth was of vital necessity. The works were built for an increase in the consumption of gas, and the fixed expenses of the company would be about the same if the present quantity supplied were doubled. The directors had had some encouragement in former years, although things fell short of their original expectations, and he thought they might confidently look forward for better times. Unfortunately, a small concern like this could not bear an exceptional strain, and the succession of trials they had undergone had permanently increased its burden. The chief difficulty in the past year had been the onerous rate of exchange on the remittances of money home. It was a charge against revenue of £600, or about 1⅞ per cent. upon the capital of the company. The losses by bad debts also had been heavier than usual. The diminished cost of coal, as representing the heaviest item of expenditure, was very gratifying. The cost per ton in 1873 was 53s. 9d.; in 1874, 49s. 6d.; in 1875, 46s.; while in 1876 it worked out to about 37s., and as regarded the present year he might state that they had landed a cargo of English coal at a rate even below this minimum, and the directors hoped, in the absence of political complications, to continue the supply of coal on equally favourable terms. He could assure the meeting that every effort had been made by the Board to keep down the expenses, and the manager was frequently reminded of the necessity for economy. The gasholder had continued to work well, and the extra storeage had proved of great service. The mains in the town were carefully looked after, and the loss of gas by leakage was very moderate. The plant and machinery were adequate for all requirements, and the provision of a small auxiliary boiler was all that was necessary. The company were on good terms with the authorities, and the manager made every endeavour to give satisfaction to the public. The directors did not hear of any complaints being made as to the supply of gas. The municipal arrangements of the town did not appear to give satisfaction, and a change of local administration was not unlikely to occur, in which case the directors would avail themselves of any favourable opportunity for increasing the prosperity of the company. As to their prospects he could only repeat that extended business was the necessary condition of returning prosperity, and this he thought they might hope for. Coals might be expected to remain at a moderate figure, though in the case of this company the rate of freight was of more consequence than the actual cost of the raw material. Exchange was still unfavourable, but this was believed to be only temporary, and therefore he was encouraged to expect that the present year would again show a further improvement, and be more satisfactory to the shareholders.

Mr. Stopford seconded the motion.

Mr. Elger said the chairman had given a most straightforward statement of affairs. He had not concealed what was bad in the past while encouraging a hope of better results in the future. The only thing that seemed to need further explanation was the item of bad debts. He hoped that there was due diligence exercised in the collection of the accounts.

The Chairman said the bad debts were heavier than usual, owing to failures arising out of the bad times of the last two or three years. He believed they would not have to make the same complaints again.

The Secretary said the loss upon gas-rental was not large. The rental was collected monthly, as was the custom in the East.

The motion was put and carried.

On the motion of the Chairman, seconded by Mr. Peill, the retiring director, Mr. Stopford, was re-elected, and returned thanks.

Mr. H. M'L. Backler moved, and Mr. Carter seconded, the re-election of the retiring auditors, Mr. Peill and Mr. Stokes, which was agreed to.

Mr. Peill, in acknowledging the compliment of his re-election, said he was sorry that he could not quite confirm the sanguine expectations held out by the chairman, of a probable increase in the prosperity of the company. It appeared to him that they had got to the minimum price of coal. He did not think freights were likely to be reduced, while, if political complications arose, they would be most likely to rise. One of the most serious, and he believed the real drawback of the company, was that the rental was not sufficient to pay the fixed expenses necessary in an undertaking of this kind. The chairman had told the meeting that, if they could double their rental, the profit on the increase would be undisturbed by the expenses. With a rental of less than £10,000, they had at the present time administrative expenses amounting to £900, even while practising the greatest possible economy. It was idle, therefore, to anticipate any great increase of dividend unless the profits were enormous, which they were not. The undertaking, indeed, was too small for a public company; it might do very well as a private enterprise, but as a public company it would not pay, so that, unless some miraculous change took place, which he did not look forward to, the shareholders must not anticipate much addition to the dividend for some time to come. He hoped he might be disappointed in the matter, and he was sure that, as far as energy and zeal in the management of the company were concerned, the shareholders could not have better men at the head of their affairs.

On the motion of Mr. ELGER, a vote of thanks was given to the chairman and directors for their attention to the business of the company.

The CHAIRMAN, in acknowledging the vote, said he had been a little taken by surprise by the remarks made by Mr. PEILL, and certainly he could not agree with that gentleman that there was no prospect of the company doing better in the future than in the past. If the rates of exchange became more favourable, and there was no rise in the price of coal, and the proportion of bad debts was reduced, he (the chairman), who was not usually over-sanguine, thought they might expect a much more satisfactory result.

On the motion of Mr. PEILL, seconded by Mr. STOKES, a cordial vote of thanks was given to the secretary.

Mr. HERSEE said he appreciated the kindness which had prompted the compliment just paid to him. It would, of course, be more pleasant for him to stand before the meeting if there was a larger dividend to declare, and he was inclined to think that the prospects of the undertaking were not so depressing as depicted. Indeed, he thought there were some very encouraging features, which would be apparent to the shareholders at the end of the year.

The proceedings then terminated.

CITY OF MELBOURNE (AUSTRALIA) GAS AND COKE COMPANY.

A Special General Meeting of Shareholders was held at the Company's Offices, on Tuesday, Jan. 23—Mr. THOMAS MOUBRAY, J.P., Chairman of the Board of Directors, in the chair.

The SECRETARY (Mr. J. Scott) read the following report and financial statements:—

Your directors submit the usual audited statements of account for the half year ended Dec. 31, 1876.

The general reduction in the price of gas to 7s. 6d., which took effect on the 1st day of July last, has, of course, diminished the revenue from that source, although, taken as a whole, under the circumstances, results, it is thought, will not be considered unsatisfactory.

The half years, working, with the balance brought forward, has left a credit of profit and loss of £9317 5s. 9d., from which a dividend is now declared at the rate of 6 per cent. per annum, absorbing £7500, leaving unappropriated and carried forward to next half year £1817 5s. 9d.

The works have been carefully maintained in an efficient state, and operations throughout have been conducted with economy and regularity. The construction of an outstation gasholder, for the better supply of districts south of the Yarra, is being pushed forward diligently, and will, it is confidently expected, be available for next winter's requirements.

Dr. General Balance-Sheet, for the Six Months ending Dec. 31, 1876. Cr.

Capital account	£250,000	0	0	Land, buildings, and apparatus	£289,168	1	8
Debentures	30,000	0	0	Apparatus in store	6,596	16	11
Interest on debentures	750	0	0	Gas-meters	19,351	10	3
Debenture redemption-fund	22,073	15	5	Coal account	3,479	8	9
Insurance account	4,005	3	9	Coke in store	250	0	0
Meter replacement account	4,500	0	0	Lime ditto	13	10	0
Bills payable	1,727	13	0	Gas-rates due to company	12,862	16	2
Deposits	29	17	3	Sundry sums ditto	1,298	18	8
Unclaimed dividend account	476	17	4	Commercial Bank, Dec. 31, 1876	13,700	15	2
Sundry sums due by the company	5,038	13	7	Cash on hand, ditto	256	3	3
Wear and tear account	19,058	12	9				
Profit and loss, as per statement	9,317	5	9				
	£346,977	18	10		£346,977	18	10

Profit and Loss Account.

Coal carbonized	£21,153	11	9	Gas-rates	£40,042	16	4
Coal used for fuel	28	0	0	Residual products—			
Cost of purifying	911	3	2	Coke sold	5,306	5	6
Directors allowance	300	0	0	Tar, &c., sold	2,766	5	1
Auditors fees	21	0	0				
Salaries	1,862	1	8				
Management of works, inspector's and timekeeper's wages	1,106	5	4				
Stokers and labourers wages	4,012	4	10				
Lamplighters, &c.	1,510	16	6				
Rent and taxes	768	3	4				
Subscriptions and donations	39	19	0				
Law expenses	59	9	0				
Cartage	414	0	4				
Water, travelling expenses, and sundries	723	1	3				
Stationery, printing, advertising, &c.	265	2	8				
Bad and doubtful debts	744	18	6				
Fines, overcharges, &c.	76	9	6				
Oil, engine packing, &c.	59	7	0				
Coal and coke sacks	53	2	6				
Meter replacement account	500	0	0				
Wear and tear account	4,000	0	0				
Service laying	1,038	19	8				
Insurance account	250	0	0				
Interest on debentures for half year	750	0	0				
Balance	7,467	10	11				
	£48,115	6	11		£48,115	6	11

By Balance at credit of profit and loss at June 30, 1876	£9,349	14	10
To Amount required for dividend, ditto	7,500	0	0
	£1,849	14	10
By Balance, as above, brought down	7,467	10	11
	£9,317	5	9

The CHAIRMAN moved the adoption of the report and balance-sheet, and in doing so said the directors considered that the financial position of the company was very satisfactory. Their constant aim had been to carry on the works with economy and efficiency, and in this object they had been ably seconded by the secretary, Mr. Scott, and the manager, Mr. Kelly. The directors had entered into a very satisfactory contract for coal for the incoming year, and altogether the affairs of the company were much more satisfactory than at the meeting of the company in July last.

Mr. M. BENJAMIN seconded the motion, which was carried unanimously.

Mr. CROPPER referred to the item in the accounts, "Bad debts." He thought the amount rather large, and for the benefit of the company, in future, he suggested the advisability of allowing a discount of, say, 5 per cent. on all accounts paid during the month.

The CHAIRMAN said that he too thought the item rather large and unsatisfactory. The matter had caused the directors some consideration, and the suggestion should have due attention.

On the motion of Mr. R. COHEN, a vote of thanks to the board of directors and officers of the company was unanimously carried, and the proceedings terminated.

SOUTH MELBOURNE (AUSTRALIA) GAS COMPANY.

The Ninth General Meeting of Shareholders was held at the Mechanics Institute, Emerald Hill, on Wednesday, the 31st of January last—Mr. J. W. RANDELL in the chair.

The report read by the SECRETARY showed that the profit for the half year was £1809 13s. 9d., from which had to be written off for preliminary and parliamentary expenses, £600; £100 for wear and tear; and £30 for bad and doubtful debts, leaving £1079 13s. 9d., which, added to the balance from last year, left a total credit to profit and loss of £1447 1s. 10d.

The CHAIRMAN, in moving the adoption of the report, congratulated the shareholders on the steady and satisfactory progress of the company. No doubt the directors expected that they would be better supported than they had been. If the persons who had promised to support the company had only honoured their signatures, and consumed the company's gas, as they promised, the balance-sheet would have been a great deal better than it was. If all the parties who had promised to take the gas had acted as some of them had done, they (the public) would have been handed over to the old companies, who would speedily recoup themselves for any loss by an advance in price. The other companies, however, had now begun to find out that this company were not to be snuffed out, and they also found out that the reduction of price to 5s. 10d. would act more detrimentally to them than to this company. Those companies had large capital invested, and with the price of gas at 5s. 10d. they could not pay those dividends that the shareholders had a right to expect. It was to the interests of all the companies to have a uniform price for gas. When the Collingwood Company's Bill was before Parliament, the South Melbourne Company were charged with offering a factious opposition, and wasting the time of the House. But the directors were fighting for the interests of the shareholders, and it was a matter of life and death to them not to allow the other company to raise a sum of money which would prove injurious to this company, and which would, in the time to come, prevent a Metropolitan Board of Works obtaining the gas-works on fair terms. All that the South Melbourne Company fought for was that the same clause should be inserted in the Collingwood Company's Bill, that there should be a uniform price of gas not exceeding 7s. 6d., which had been inserted in the South Melbourne Bill through the instrumentality of the Melbourne and Collingwood Companies. That would have been satisfactory to the Legislature and the general public, but the Collingwood Company would not agree to it. He thought, however, that that company would be no more successful in the next session than they had been in the past one. In regard to the South Melbourne Gas Company, he might say that the whole of their works were in the most satisfactory condition. Mr. A. K. Smith had made a most elaborate report upon the works, and without the expenditure of another shilling the company could turn out three times the amount of gas that they now did. He hoped that at the next meeting the directors would be in a position to pay a better dividend than hitherto. They might have declared a dividend this half year of 6 per cent.; but, from what had occurred at previous meetings, they believed that the shareholders would be better satisfied to carry the balance forward to next account. The company had a large body of shareholders, twice as many as the other two companies put together, and if those shareholders would consume only this company's gas, the consumption would greatly exceed that of those companies.

Mr. MALLETT seconded the motion for the adoption of the report, which was agreed to.

The retiring auditor, Mr. Runting, having been re-elected,

Mr. BUTTERS moved—"That as the object for which this company was established—namely, a great and permanent reduction in the price of gas, has been accomplished, it now desirable to protect the interests of the shareholders by making an amicable arrangement, if possible, with the other companies to establish a uniform rate of 7s. 6d."

Mr. DERHAM seconded the motion, which, after some conversation, was adopted.

On the motion of Mr. PAGE, a vote of thanks was awarded to the chairman and directors for their management of the company's business.

This terminated the proceedings.

COLLINGWOOD (AUSTRALIA) GAS COMPANY.

The Half-Yearly Meeting of Shareholders in the Collingwood, Fitzroy, and District Gas Company was held on Jan. 31 last—Mr. GEORGE JAMIESON in the chair.

The CHAIRMAN moved the adoption of the directors report, and the motion was seconded by Colonel STEVENS.

Mr. A. K. SMITH suggested a conference of the different companies to put an end to the present suicidal competition. He recommended a reduction of expenses. If there was to be any permanent reduction in the price of gas, it could only be done by preventing abnormal and unnecessary expenditure.

After a few words from Mr. ROBERTSON in support of a conference,

The CHAIRMAN said that the directors had no desire to cut the price of gas down further than was necessary; and the low average of the last six months (6s. 10d.) arose from the introduction of the South Melbourne Gas Company into the system. He thought he could see a way to considerable improvement. The determination of the directors was to spend as little money as possible. If the other companies wished a conference, the directors would be ready to join, but he confessed that the prospect did not seem very clear. They must wait a little longer, and see what they were to make of the South Melbourne Company.

In the course of a short discussion,

Dr. EMBLING suggested that the shareholders should give the directors their undivided support.

The report was adopted, and a dividend of 6s. per share declared.

Mr. W. H. Barlow was re-elected auditor.

The meeting closed with a vote of thanks to the chairman and directors.

METROPOLIS GAS SUPPLY.

Dr. Stevenson's report on the gas supplied by The Gaslight and Coke Company to the Vestry of St. Pancras, during the month of April:—Maximum light, estimated by sperm candles, according to the Act—18·2 Minimum light, sperm candles—16·0. Average light, sperm candles—16·7. Traces of ammonia, indicated by turmeric test-paper—Traces on all occasions. Traces of sulphuretted hydrogen, indicated by lead test-paper—none on any occasion. Sulphur, 10·76 grains per 100 cubic feet.

QUALITY OF THE NEWCASTLE-ON-TYNE GAS.—Mr. John Pattinson reports as the results of his examinations for the month of April of the quality of the gas supplied to the borough by the Newcastle-upon-Tyne and Gateshead Gas Company:—

Date.	Illuminating Power in Sperm Candles.	Grains of Sulphur in 100 Cubic Feet of Gas.	Sulphuretted Hydrogen.
April 3	15·1	6·74	Nil.
„ 6	15·2	7·25	„
„ 10	15·0	8·71	„
„ 13	14·7	19·31	„
„ 17	15·0	19·03	„
„ 20	14·3	18·64	„
„ 24	14·5	10·39	„
„ 27	14·5	30·02	„

A Sugg-Letheby standard Argand burner is used in testing. According to Act of Parliament, the gas should not be of less than 14 standard candles illuminating power, nor contain more than 17 grains of sulphur per 100 cubic feet of gas.

THE CHEMISTRY OF GAS MANUFACTURE.

By A. Vernon Harcourt, Esq., F.R.S.,
One of the Metropolitan Gas Referees.

[A course of Four Cantor Lectures delivered at the Society of Arts, London.]

Fourth Lecture.—Monday, March 26.

In the preceding lectures I have dealt with those products of the destructive distillation of coal, which are mainly eliminated in the course of the manufacture of coal gas, and I have to speak to night of those substances which are the ingredients of purified coal gas. In the table on my right there are given the results of the analyses of various samples of coal gas made some years ago by Dr. Frankland. The figures show that the principal constituents are two—hydrogen and marsh gas. The relative proportions of hydrogen and marsh gas vary to some extent, but, as a rule, that of hydrogen is the larger, so that an average sample of coal gas contains nearly 50 per cent. of hydrogen, and about 36 per cent. of marsh gas. The proportion of the gas next in amount is much smaller; of carbonic oxide there is generally about 8 per cent. Next comes a group of constituents—comparatively small in quantity, but chief in importance—olefiant gas and its homologues, which may be regarded as condensed forms of olefiant gas, and of these the proportion is about 5 per cent.

I have here some bottles filled with these principal ingredients of coal gas—hydrogen, marsh gas, carbonic oxide, and olefiant gas. They are all as colourless and transparent as air. I will endeavour, in the first place, to show you some of the differences in their properties, and, in the next, to effect the synthesis of coal gas. by mixing them in the proportions in which they are found to co-exist. I pour hydrogen from this bottle upwards, through the water of the pneumatic trough, into a bell jar, which is fitted with a bat's-wing burner on the top, so that I may be able to burn the gases in succession, and you may be able to judge of the difference in their illuminating power. I will pass up sufficient of each to show you the kind of flame which the gas produces, and, as I shall burn them all under the same pressure, and with the same burner, you will be able to make a very fair comparison of their illuminating power. I have now some hydrogen in the jar, and by depressing the jar into the water of the pneumatic trough, I have put it under pressure, and on lighting it you see the kind of flame with which hydrogen burns—a flame of very high heating power, but by itself of very small illuminating power. You see how colourless and non-luminous it is, but also to what intense brightness it ignites a coil of platinum wire which I hold in it.

Now I will repeat the experiment with marsh gas. Here you see I have, as compared with hydrogen, a gas burning with considerable illuminating power; and although the gas, which has been prepared in the ordinary way, by heating together soda-lime and sodium acetate, is probably not perfectly pure, and the illuminating power may be somewhat greater than it would be with pure marsh gas, yet I have never seen a sample of marsh gas which had not some illuminating power; and I think, therefore, the statement frequently made, that marsh gas is to be regarded, like hydrogen and carbonic oxide, simply as a diluent of coal gas, combustible but non-luminous, must be accepted with some reserve.

Next I will take the carbonic oxide. There you have the characteristic blue colour, and a scarcely luminous flame. In this case, as in the case of hydrogen, I may show you that this non-luminous flame has an exceedingly high heating power by holding in it the spiral of platinum wire.

I have still one other of these principal ingredients to examine—namely, olefiant gas; but while that is being brought into the bell-jar, I may pass on to the consideration of the heat which is produced by the combustion of these gases. I have a table here, which Dr. Frankland has kindly lent me, showing some of the different effects of burning marsh gas, carbonic oxide and hydrogen. There is a difference, though not an important one for any practical purpose, between the quantities of oxygen which are consumed by the three, marsh gas consuming four times as much oxygen as is consumed by either carbonic oxide or hydrogen, the two latter consuming it to the same amount. As to the carbonic acid generated, marsh gas and carbonic oxide both produce their own volume of carbonic acid, while hydrogen, of course, produces none. There is a difference also in the amount of heat that is generated by the combustion of equal volumes of these three gases. One cubic foot of marsh gas, measured under standard conditions—that is, at a temperature of 60° Fahr., and under a pressure of 30 inches of mercury—will heat, by its combustion, 6 lbs. of water from freezing-point to boiling-point. One cubic foot of carbonic oxide would heat 2 lbs. of water through the same range of temperature—that is, it produces only one-third the amount of heat which is produced by the combustion of an equal volume of marsh gas. Lastly, the heating power of hydrogen is very nearly the same as that of carbonic oxide, comparing, of course, volume with volume, not weight with weight.

Now I will return to the experiment with the olefiant gas, and you see that I have here a gas which really is too powerfully illuminating to be burnt in such a burner; that is to say, it gives a brilliant light, but burns with a smoky flame, and the full illuminating value of it is not produced. Although I think marsh gas should not quite be regarded as hydrogen and carbonic oxide are regarded, as merely combustible diluents, yet no doubt the principal source of the illuminating power of coal gas is the relatively small proportion of olefiant gas which it contains.

Now I will make from the residues of these gases, which remain in the bottles, a mixture to represent coal gas. I mix first those three having least illuminating power—the hydrogen, the marsh gas, and the carbonic oxide; and I will show you what amount of light is obtained by burning a mixture of these three gases by themselves. Then I will add the proper dose of olefiant gas, 5 per cent. or so, which coal gas ordinarily contains, and show the difference in the illuminating power thus produced. I have now about one-half the bell-jar full of hydrogen; next I put in marsh gas to about one-third of its capacity, and then about one-tenth of carbonic oxide. I cannot allow them much time for diffusion, but in a vessel of this diameter gases mix very rapidly; and I will now burn a little of the mixture as it is, this being in fact coal gas, *minus* olefiant gas. You see that we have a gas of very poor illuminating power. The illuminating power is not *nil*, but it is exceedingly small. I have here a cylinder on which I have measured off a volume which is one-nineteenth of the volume of this bell-jar measured down to the point to which it is now filled with the mixture of gases, so that if I pass up into the bell-jar the olefiant gas which this cylinder contains, I shall have added 5 per cent. of olefiant gas to the mixture, whose small illuminating power you have already seen. I must allow it a few moments for diffusion, and in this case I cannot freely stir the gases together by agitating the water beneath them, because olefiant gas is sensibly soluble in water. I now expel the mixture through the burner and light it, and you see that I have a gas which has about the ordinary illuminating power of coal gas.

I propose now to make a few observations upon the nature of flames. I have arranged here an experiment in order to illustrate this fact, that what we speak of as flame is a phenomenon occurring at the common surface of two gases capable of acting chemically one upon another with the production of a temperature of incandescence, that incandescence being either the incandescence of a solid or of a gaseous substance. Thus we may either have coal gas or any other so-called combustible gas burning in the air, or we may have the gas which I have now succeeded in lighting, namely air, burning in coal gas.

I have fitted up a large lamp-chimney with a cork at each end. Two glass tubes pass through the lower cork; one, of a quarter of an inch in diameter and 5 inches in length, is central, and rises one inch within the chimney; the other, by its side, passes just through the cork, and is connected with the gas supply. A third tube passes through the cork in the top of the chimney, and serves as outlet. I am sending through the chimney a slow stream of coal gas, which is now burning at the top of the apparatus. The coal gas within the chimney, being lighter than air, produces a small diminution of pressure towards the bottom, and therefore a slow current of air enters the chimney by the open tube. The jet of air thus produced, having been lighted at the end of the tube within the chimney, and being in an atmosphere of a gas with which it can combine, produces a flame in which air is the inside gas, and coal gas is the outside gas. Burning above is a flame differing from that below only in this respect, that common air is the outside gas and the coal gas is inside; so that here we see two phenomena which are perfectly similar, although one is much more familiar than the other. You see the degree of resemblance between the two flames. There can be no doubt that if our constitution were such that we were capable of living in an atmosphere of coal gas, and if we were able to make from any material, which would then correspond to coal, a gas having the nature of atmospheric air, we could lay it on and light our streets and houses with air as we now do with coal gas.

Now the nature of flame being of this kind, there is a further question, and a very important question, as to the nature of luminous flames, and as to what is the common property to which different flames owe their luminosity. In the case of what may be described as hydrocarbon flames, such as the flame of coal gas, the theory of Sir Humphry Davy is, I believe, the true theory—namely, that their luminosity is due to the presence of solid carbon in the flame. It has been pointed out that there are examples of highly luminous flames in which there is no solid matter. If we burn a substance of which I spoke in my last lecture—carbon bisulphide—in an atmosphere of oxygen, we have an intensely luminous flame, although the substances produced—carbonic acid and sulphurous acid—are both at the ordinary temperature gases. Even in the case of one of the most brilliant of flames, that produced by the combustion of phosphorus, the oxide of phosphorus at the high temperature at which it is formed is also gaseous; and there are some other highly luminous flames in which nothing solid is present. But there are also plenty of examples of flames, otherwise non-luminous, which are rendered luminous by the introduction into them of a solid substance.

In the case of the flame of a candle or of coal gas, a finely-divided solid substance is formed in the flame. At the high temperature which is produced by the burning of carbon and hydrogen in the outer zone of the flame, the gas which is still within this zone, and has not yet emerged into the air, or into the presence of a sufficiency of oxygen for its combustion, is decomposed and deposits its carbon; and it is to the ignition and incandescence of this carbon that the luminosity of the flame is due. In a word, what we see in the flame of coal gas or of a candle is soot heated to whiteness. I will try to illustrate this to you by a very simple experiment. I have here a Bunsen burner, burning with its well-known non-luminous flame, and I have placed round it a tray formed of a piece of stiff paper, on which there is a layer of lampblack. On shaking this paper, particles of the lampblack rise in fine dust, and pass through the openings for air at the bottom of the burner, and so rise in a fine carbonaceous cloud into the flame. You see that as long as the cloud is kept up the flame is luminous, but as soon as the agitation ceases the flame burns as usual in a non-luminous manner.

There is another experiment I need hardly make, it is so familiar. If we dip any cold substance into a luminous flame of coal gas or of a candle, a black carbonaceous coating is deposited upon it. No doubt that is not conclusive as to the presence of carbon in the flame. It might be the case that that which otherwise, at the high temperature of the flame, is gaseous, becomes solid when it is brought into contact with the cold substance upon which it is deposited. Moreover, the deposit which is thus formed does not consist of pure carbon, but contains a certain amount of hydrogen. That, however, is also true of coke and charcoal, and of every portion of carbon which is produced by the ignition of a substance in which hydrogen was once united with carbon, however high the temperature applied may have been. When coal gas or any gaseous hydrocarbon is heated to redness in a glass tube, more condensed hydrocarbons—or what are called with convenient vagueness tarry matters—are formed and deposited. And if these tarry matters are strongly ignited, air being excluded, a solid residue always remains. These conditions exist in the interior of a gas-flame, and, apart from the evidence furnished by the deposition of soot on a cold object placed in the flame, it seems certain that a solid non-volatile hydrocarbon must locally and transiently be formed.

Now as to the conditions which render a flame of this kind more or less luminous. I have arranged here an experiment, for which I am indebted to Professor Heumann, which illustrates well the effect of a more or of a less rapid and intense combustion upon the flame of coal gas. I have a bottle of oxygen, fixed in an inverted position, and I will burn a small jet of coal gas in the oxygen; and while it is burning, I will describe to you what I conceive to be the nature of the changes which occur. The first thing I wish you to observe is that the gas, which was burning in the air with a fairly long and luminous flame, when placed within the oxygen gives a brighter point of flame, but so much smaller, that on the whole the light emitted is less than it was before. But that light will continually increase—it is already greater than it was when the jet was first placed within the bottle. The flame grows in size, diminishing a little in whiteness and brightness, but increasing in the total amount of light which is given out, up to a certain point; and after that point has been reached and passed, then the flame continues to increase in size, but the total production of light again diminishes. Some interesting observations have been made upon this series of changes. In the first place, it seems that the amount of light which is given by a coal-gas flame burning in air depends simply upon the degree of dilution of the oxygen with an indifferent gas, and that it is immaterial whether that gas is nitrogen, as it actually is in the case of air, or whether it is some other gas, such as carbonic acid; in any case the luminosity reaches its maximum when the proportion of the diluent gas is about that which it is in our atmosphere—that is, about four parts of diluent to one of oxygen. You observe now that the flame, burning in a mixture of oxygen and carbonic acid, has very much the same appearance as it had when burning outside in the air. At this point, I believe, if an analysis of the gas were made, we should find that one-fifth of the gas remaining in the bottle was oxygen, and that four-fifths were carbonic acid or steam. But you see as the dilution of the gas advances, the quantity of oxygen in the bottle being progressively diluted with the products of combustion, the luminosity continually diminishes whilst the size of the flame increases, and you see at last a large flame wholly non-luminous.

There are, however, several other conditions upon which the degree of luminosity of a flame depends. One of these, which has been carefully investigated by Dr. Frankland, is the density of the atmosphere in which the gas burns. His experiments began with some observations which he made upon the combustion of candles at different heights. The same candles were burnt first at Chamounix, and then at the top of Mont Blanc,

and it was found that the rate of combustion was unaffected by the considerable difference of barometric pressure at these two different elevations; but it was observed that the luminosity of the candles was much less at the higher than it had been at the lower level. The observations were afterwards carried further by burning a jet of gas in an apparatus in which the atmospheric pressure could be varied at will. The general result, expressing by 100 the illuminating power observed at the ordinary atmospheric pressure of 30 inches of mercury, was that, down to a pressure of 14 inches, each diminution of one inch of barometric pressure produced a decrease in illuminating power of 5·1; from which it follows that the ordinary variations of atmospheric pressure, amounting to 2 inches or more, produce very appreciable differences in the illuminating power of the same sample of gas. Or again, the same sample of gas burning in two towns at different levels, and thus being under a different atmospheric pressure, will exhibit different illuminating powers.

Another condition is the temperature of the flame. Other things equal, the illuminating power appears greater in proportion as the temperature of the flame is higher. An interesting experiment has recently been made by substituting for the brass tube with which Bunsen burners are ordinarily furnished, a platinum tube, which can be heated to redness without giving off any substance which will colour the flame or render it luminous; when the gas is lighted, and the tube through which it is passing is heated with a strong horizontal jet of flame from a blowpipe, the non-luminous flame becomes, to some extent, luminous. The explanation given is that a mixture of gas with so much air as to render it non-luminous at its normal temperature of combustion becomes luminous when the temperature of the flame is raised by a previous heating of the mixture. An alternative explanation, which naturally suggests itself, is that the change in the luminosity of the flame may depend, not upon the alteration in the temperature, but upon some change produced in the composition of the mixed gas and air by its being locally exposed to a high temperature previously to combustion. But it is said that if the gas, which, when it is burned immediately after it has been heated, gives a luminous flame, is conducted through a certain length of tube—so that it may have lost the high temperature without any further change in circumstances—and then is burnt, the flame is non-luminous as before. It is said also that in the tubes through which the gas is led, no deposit is observable, as would be the case if the changes were due to the production and condensation of some tarry matter by the action of the high temperature on the mixture of gas and air.

There are a number of interesting questions connected with the relation between temperature and luminosity, such as the cause of the interval seen to be interposed between the burner and the flame, that interval probably depending on the cooling influence of the metal tube of the burner. A similar effect is observable if any conducting material, such as a piece of metal, is placed within the flame. In this case a non-luminous interval may be seen, where there seems to be no flame at all, between the cold substance which is thrust in, and the body of the flame. The reason seems to be that the contact with such a substance lowers locally the temperature of the burning gas below the point at which combustion takes place. A fact that we often have occasion to observe in a chemical laboratory is this, that if we depress a large vessel containing water into a Bunsen flame, there is a smell of unburnt gas, or partly-burnt gas. No doubt the introduction of a large cold surface into the flame cools the gas so much, that a considerable portion of it no longer reaches the temperature required for combustion, and although part of the gas is burning, part of it escapes unburnt or incompletely burnt.

There is another point of very great importance as affecting the brightness of a flame—namely, the manner of contact between the gas and the air. Indeed, in the construction of burners, the point of greatest importance is to bring the two together in such a manner as that the production of finely divided carbon, in the first place, and a strong ignition of the finely divided carbon in the second place, may be promoted as far as possible. I will show you a very simple experiment, which illustrates the great importance of the manner of bringing together the coal gas and the air. I have a small gasholder here, charged with coal gas; I am able, with the column of water at the top, to obtain a stronger pressure than that at which gas is supplied. Here is an ordinary bat's-wing burner. By supplying the gas at the rate at which the burner is designed to consume it, I have the ordinary flame; but now, on turning on this tap, so as to get a more rapid flow of gas, you observe the effect. First, I have an increase in the size of the flame, and, probably some increase in the total amount of light; as I open the tap more widely, the quantity of gas that is burned continually increases, but, instead of the illuminating power being improved, it is almost destroyed. That is the effect of having gas brought into the air at a high pressure. You see that, although I am consuming much more gas, the burner yields very much less light than it does with quite a small flame. The reason is that the gas rushing thus into the air produces a rapid admixture of itself with the air.

In this experiment the distance of the flame from the burner depends upon the relation between the rate of issue of the gas and the rate at which the combustion of the mixture of air and gas travels towards the point from which the gas issues. Bunsen has made experiments upon the rate at which combustion is propagated, by charging a tube with a mixture of oxygen and hydrogen, in the proportions in which they combine, and observing at what rate the combustion of this explosive mixture travels from one end of the tube to the other. When gas is burning, there is always a race in opposite directions, the gas issuing from the burner at a certain rate, and the combustion propagating itself from the outer part of the flame inwards towards the burner at another rate. The *locus* of the inner edge of the flame depends partly upon the absorption of heat by the burner, partly upon the relation between these two rates. In the case of the roaring, non-luminous flame, which I showed you just now, the flame was a long way from the burner, the reason being that the velocity of the gas at the point of issue greatly exceeded the rate of propagation of its combustion, and only was made equal to it by the resistance of the air operating through a considerable space. We are all familiar with the principle of the steam-jet, in which a current of air is produced by sending a jet of steam under strong pressure through a tube to which the air is admitted. Its action may be compared with that of a current of gas issuing under pressure into a still atmosphere. The jet of steam carries on, by mixing with itself, the air in contact with it; and in the same way gas issuing under pressure carries along and mixes with itself the atmosphere around it. Thus by burning gas under a high pressure exactly the same state of things is brought about as in the Bunsen burner; that is to say, the gas becomes mixed with so large a proportion of air that there is no part of the flame where carbon is deposited and becomes incandescent, and consequently the flame is non-luminous.

I may illustrate this point in another way. I have here two exactly similar Argand burners, which I will adjust so that their flames may be equal, and now I am going to substitute for the chimney of one of them a much longer chimney. You will see, on comparing these two flames, that the difference between them is something like the difference between the appearance of the jet of coal gas burning in the bottle of oxygen, and that of the same jet burning in the air. The burner with a longer chimney has a whiter flame, and, considering only the unit of area, a brighter flame, but on the whole the photometer would show that it is giving less light than the other. For we must remember that the total luminosity of a flame is the product of two factors—of the brightness of the unit of area and of the total number of such units. In other words, flames differ one from another both in brilliancy and in size, and the quantity of light emitted by a flame depends upon its brilliancy and also upon its size. In this case, the effect of putting on the longer chimney is that there is a much stronger draught, and more air is drawn through than is needed for the most advantageous combustion of the coal gas; and, consequently, although the actual flame is brighter, the total amount of light got out of the same volume of gas is less than it is in the other case.

I have here a drawing of one of these Argand burners, made to show you some of the points of importance in their construction. One I have already called attention to—namely, the proportion between the quantity of gas that is burnt and the size of the chimney. It is of great importance that the openings for the admission of air below, and that the chimney should be of the right dimensions for the quantity and quality of gas that is burnt, and these are matters of very fine adjustment; so that one ought properly to have a different chimney for the same rate of burning for each quality of gas, or for the same quality of gas burning at different rates. Then the manner in which the air reaches the gas is also of importance. This sectional drawing shows a cone, the object of which is to cause the current of air to impinge on the flame of the gas. In an Argand burner there is an admission of air through the centre, and so the flame burns in a ring, the air having access to it both within and without. Another point of great importance which the experiment I just showed illustrates is, that the gas should issue into the air very gently. If it enters with a rush, it mixes itself with the air, and there is a loss of light. Consequently, in well-made Argand burners the holes in the steatite chamber, from which the gas burns, are made very large relatively to the quantity of gas which is to pass through them.

I pass now to the measurement of the illuminating power of gas, and I will illustrate to you the manner in which the estimation of the illuminating power of gas is commonly made by taking this candle as the unit of comparison, and this burner, which is one of the standard burners that are employed in photometry, for the burner at which the gas is consumed. I have here also one of the discs which is used in photometry. It consists of three paper discs of the same size, the outer ones being of thin paper, and the inner one of stouter paper, with a star cut out in the centre. Either such a disc as this, or one with a round grease spot in the centre, will serve the purpose. If I place this disc midway between the candle and the lamp, it receives the light of the candle on one side and the light of the lamp on the other, and since the light of the gas-lamp is very much greater than the light of the candle, you see on the side on which the candle is, a dark star on a white ground. But if I bring the disc near to the candle until the light which reaches it from the candle is greater than that which reaches it from the lamp, then the conditions are reversed, and you see a bright star upon a dark ground. Now, if I move it between the two until the light which reaches each side of it is equal, the star disappears. Therefore, the disappearance of the star serves as an indication that the disc is so placed between the candle and the gas-flame as to receive equal light from each. Now we know that the light which comes from any source of light varies inversely with the square of the distance of the object illuminated from that source. We, therefore, can compare the amount of light proceeding from the gas-flame and from the candle, by simply measuring the distance between each of them and the disc. Now, if I were to measure the distances between the candle and the disc, and the lamp and the disc, when the disc is in the position of equal illumination, I should find probably that the distances were very nearly as four to one, the distance from the candle to the disc being about one-quarter of the distance between the disc and the gas-lamp. This would be the case if my standard candle were consuming sperm at the proper rate, and if the gas burning at the standard rate of five feet an hour was of the illuminating power of 16 candles. Or to argue from the observed intervals to the illuminating power: since the amount of light varies inversely with the square of the distance from the source of light, and the ratio of the two intervals is as four to one, the illuminating power of the gas, compared with the illuminating power of the candle, is as sixteen to one. It is in this way that the luminous power of a sample of gas is estimated.

It is, however, necessary that the gas should be burnt under certain fixed conditions. The rate at which the gas is to be burnt has been fixed at 5 cubic feet an hour, and the burner at which the gas is to be burnt has also been fixed. During the past year the standard burner has been defined by an exact measurement of all its important parts, the height of the cone and of the steatite chamber above the gallery on which the chimney stands, the size of the holes from which the gas issues, and the internal and external diameter of the steatite chamber. This burner was constructed by Mr. Sugg, and is a most excellent burner, although I believe he has improved upon it since. The fixing of the burner by Act of Parliament was a very important step, and one quite in the right direction, in order to establish a fixed measure of the illuminating power of the gas which the gas companies undertake to produce.

Besides a fixed manner of burning the gas, it is also necessary that there should be a standard of illuminating power, and that which is used in this country for the standard is a sperm candle, one of six to the pound, and burning 120 grains an hour. The ordinary way in which the testings are made is by using two such candles fixed side by side, and comparing their light, by means of the disc in the manner I have described, with that yielded by the gas burning at the rate of 5 cubic feet an hour at a standard burner. There are certain corrections which need to be made in using the candles. Although they are intended to burn at the rate of 120 grains per hour, sometimes, as one would expect, they burn more, and sometimes less, than that amount. It is assumed, although the assumption is only an approximation to the truth, that the light given by the candles will vary directly with the weight of the sperm consumed; and, accordingly, the candles employed are weighed before and after each testing, and a proportional correction of the result is made, if more or less than the proper quantity of sperm has been consumed. Candles are certainly a very imperfect standard of comparison. The amount of light that the candle gives varies, not only with the rate at which the grease is being consumed, but with a number of other conditions, with the curvature of the wick, with the surrounding temperature, and with the way in which the candle is burning from minute to minute, a different amount of light being produced by a candle when its cup is full of grease, and when it has been drained dry by guttering or the capillarity of the wick. These differences are by no means inconsiderable, and, consequently, photometric observations are always uncertain, however carefully they have been made, since the standard used for comparison is itself variable. I have been endeavouring for some time to obtain a substitute which should be more satisfactory than the candles, and I wish, in concluding this lecture, to bring before you a form of standard light which I have recently devised.

What are the points in a candle which are unsatisfactory, and in what is a change needed in order to obtain a more satisfactory standard? First, there is the uncertainty as to the composition of the candles. I believe

that they are not made of pure sperm, which is too brittle, and that the manufacturer needs to mix from 5 to 10 per cent. of white wax, or a small quantity of paraffin, with the sperm, to make a serviceable candle. Next, the number of strands in the wick, which is the burner of the candle, may be varied, and the size and formation of the wick have a considerable effect upon the illuminating power. Also, as has been pointed out, the mode of burning and light of the same candle fluctuates greatly from time to time.

In order to have a material which should be more definite, I propose to employ an "air gas," a mixture of light petroleum with air. Such a gas may be readily obtained of any desired illuminating power. The light petroleum may be procured in large quantities at a moderate price, and by three or four rectifications, between 50° and 60° C., a product is obtained which volatilizes into the air readily and wholly at a low temperature. The gas which I am here burning was made by passing air through the water which is contained in this Woulfe's bottle, having previously placed upon the surface of the water a measure of light petroleum. The whole operation of making the gas consists in charging a pipette with light petroleum, placing the point of the pipette within the Woulfe's bottle, and allowing the volatile liquid to flow down upon the surface of the water, quickly replacing the corks, and connecting the outlet tube of the bottle with a gasholder, increasing the weight of the counterpoise, and opening the tap. The air then bubbles up through the water, and through the layer of petroleum which floats upon the water; the petroleum volatilizes, and mixes with the air. In order that the gas may have a definite illuminating power, it is necessary to take known amounts of air and petroleum, and such a quantity of air, and petroleum so volatile and in such quantity, that the whole of the petroleum employed may volatilize into the air. The reason for having water in the bottle is, that for the volatilization to proceed regularly, there should be a level surface, which the water provides, and also that a quantity of heat should be supplied to the petroleum, for it becomes very cold by its own evaporation, and that heat the water furnishes.

Next, it is requisite to have a very definite burner. That it should be a good burner is not at all necessary; but it is essential that it should be thoroughly definable. The burner I have here is a very simple one; it is a brass tube, 4 inches long and one inch in diameter, the upper part being closed by a plug, half an inch in thickness, with a cylindrical hole in it, the diameter of which is a quarter of an inch. The gas, therefore, issues practically at no pressure at all and passes out freely into the air. A pair of such burners are fixed side by side, like the candles in the holder of the photometer. In each tube I have packed a little asbestos, in order to have the means of equalizing the proportion in which the gas divides itself between the two. That, however, has no influence at all upon the way in which the gas-flame burns; the upper part is clear, and the gas streams out freely into the air.

The first step towards obtaining a standard gas was to ascertain experimentally, with various proportions of air and petroleum, which proportion gave with this burner the most constant flame, and at what rate each sample needed to burn to give from each gas-burner the light of one candle. I find I can make the gas such that the rate of burning is a convenient round number. The gas is now passing through the meter at the rate of one cubic foot an hour, and to each of these burners, therefore, at the rate of half a cubic foot an hour; and the two flames are now giving, but much more regularly, the same light as the standard candles burning beside them.

I have made many experiments, comparing in a photometer the light of such gas-flames with the light of the candles, and altering slightly the proportion of petroleum until I have got this equality. I think that this gas-flame will have as an unit of light the advantage over the candles of greater definiteness of substance, and far greater definiteness in the conditions of burning. I find also that the flame is very much steadier in the photometer than the candle-flame. The whole experiment lies in the hands of the operator; he has not to depend on the maker of the candles, for he makes the standard combustible himself. The burner is perfectly definite, and the gas itself is very readily and quickly prepared. The rectification of the petroleum is an easy operation on a scale which yields enough light petroleum for the preparation of from 10 to 20 samples of standard gas.

This question of the unit to be employed in the measurement of the illuminating power of coal gas, which I have thus attempted to solve is the last topic on my list, and concludes the course of lectures which your Council have done me the honour to ask me to undertake.

THE RIVER THAMES.

At the Sixteenth Ordinary Meeting of the Institution of Civil Engineers —Mr. GEORGE ROBERT STEPHENSON, President, in the chair—the paper read was on "The River Thames," by Mr. J. B. REDMAN, M. Inst. C.E.

It was not known whether the Romans or the Saxons carried out the earliest engineering works on the Thames. These were the embankments of the lower reaches, which shut out about 30 square miles of saltings, formerly overflown, but now from 3 feet to 7 feet under high-water spring tides, representing at the lesser depth 70 million tons of tidal water. The tidal column from Teddington to Gravesend was equivalent to 107,544,643 tons, so that the quantity abstracted might be said to be equal to from five-eighths to three-quarters of that volume. If the water were raised 12 inches in the upper reaches, on an average, by the embankments, one-eighth of the quantity would be returned. The low-water equivalent was even more conjectural, but no doubt the low-water *régime* had been deepened, and the course of the river had always been the low-water channel.

The removal of Old London Bridge, and subsequently of Blackfriars and Westminster Bridges, created a revolution in the tidal condition. On the Thames, as on the Tiber and on the Clyde, bridge engineering had been antagonistic to river conservancy. Waterloo Bridge was a case in point at the present time. The systematic removal of the low-water shoals, in addition, had developed the flood and accelerated the ebb, and about 37 per cent. had been added to the above-bridge tidal volume. The result was an earlier and a longer flood, with increased altitude, and a shorter, lower, and greater scouring agent on the ebb. Five centuries back, high water at London Bridge was three hours after the moon's transit; now it was two hours. During the last two centuries, the period of flood had been accelerated one hour and a half; and high water was at present half an hour earlier at London Bridge, as compared with Sheerness, than half a century back. This was mainly due to the removal of Old London Bridge, which had a water-way of 7300 superficial feet, as compared with 17,600 feet, that of the present structure. This correspondingly impeded the tide, which now flowed higher 12 inches and ebbed 4 feet lower above bridge than in former years.

The volume of water flowing over Teddington Weir was 3,223,125 tons daily. The present daily quantity supplied to the London Water Companies was 542,958 tons, or about one-sixth of the land water. This was equal to 198,179,670 tons annually, sometimes estimated at 250 million tons. The annual outflow of the river was 1,176,440,625 tons, equivalent to 3½ inches of rainfall over the drainage area of 5162 square miles. An annual rainfall of 24 inches would yield 8,030,597,142 tons; one-fourth of this amount, after allowing for absorption, evaporation, &c., was 2,007,649,285 tons of available water. This, however, was one and two-thirds the actual result, so that instead of 6 inches of annual rainfall being available, not much more than about one-half, or 3½ inches, were so, and this was only four times the quantity required for the Metropolitan water supply. The average outflow was equal to from one-sixth to one-seventh of the annual rainfall.

High water at Sheerness was fixed by Colonel Lloyd, in 1880, as being 2 feet lower, and low water as being 20 inches higher than at London Bridge; but the tide now ebbed lower at London Bridge than at sea. Great tides had flooded London from an early period, varying from 3 to 4 feet above Trinity standard. Pepys mentioned that of Dec. 7, 1663, thus: "I hear there was the last night the greatest tide that ever was remembered in England to have been in this river; all Whitehall having been drowned." The extreme range at Gravesend was 27 feet. The quantity of tidal water shut out by the Thames Embankments was estimated at 365,000 tons; but they had compensated for it by raising the tidal column, and were thus recuperative. If the water surface from Blackfriars to Teddington had been raised 6 inches, that would be equivalent to 700,000 tons.

To show the impossibility of providing reservoirs for land water, Mr. Symons had estimated that storeage for 714,285,714 tons would be required, equal to from three to four times the daily tidal volume from Teddington to Gravesend. The winter flood of 1875 at Windsor amounted to 33,723,925 tons daily, so that Mr. Symons's estimate of storeage would be for 21 days of the great flood. The average volume of extreme tides from Teddington to Gravesend was 322,500,000 tons, so that the land flood water was one-ninth of the tidal water, or rather one-eighteenth during the day. The morning and afternoon tides of April 8, 1874, both rose 21 inches higher at Blackwall than at Gravesend, 10 inches higher at London Bridge than at Blackwall, and at Westminster and at Lambeth 4 inches higher than at London Bridge. The present low-water level was from 5 inches to 14 inches lower at London than at Sheerness; and at Gravesend low water was lower than London by 9 inches, and than Sheerness by 12 inches. The level of high water for a mean of the three years 1873-74-75 was 3 feet 10 inches higher at London than at Sheerness. The spring and neap high water differences varied from 6 feet to 2 feet. The maximum difference of range in favour of London amounted to 6 feet 7 inches, but usually it was 4 to 5 feet. Thirty years back high water was 4½ inches to 6 inches lower at Chelsea, and 12 inches lower at Battersea, than at London Bridge, and the low-water level was 15 inches higher. The tide of Nov. 15, 1875—the result of the great westerly gale of Sunday, Nov. 14—aided by a heavy land flood, was the highest on record—viz., 4 feet 9 inches above Trinity standard, and exceeded the Admiralty calculated range by 3 feet 3 inches. Of that great tide, from 3 to 4 inches were due to land water. The tide of March 20, 1874, rose the same height at Teddington as at Westminster—viz., 4 feet 4 inches above Trinity standard, rising 18 inches above the land water, with 7 feet oscillation at Teddington, and 12 inches at Kingston; and this tide was 20 inches higher at London Bridge than at Gravesend. The estimate of compensation due to the raising of the tidal column by the embankments might be largely increased, as the estimate of 6 inches was only taken above a plane, nothing being added for the former fall at high water above Westminster. There was now an additional depth of 12 inches at high water from London up to Richmond, where the tide flowed fully as high as in the Pool. Due to the increase of tidal volume and the dredging of shoals, the low water deep channel had been extended upwards past Woolwich and Blackwall. There were two artificial barriers to its continued extension, or at least to its availability for navigation. The first was the Thames Tunnel, which had only a depth of water of 8 feet over the crown at low water, with a normal depth above and below of 10 feet to 11 feet, and a similar condition of things existed at Waterloo Bridge. The highest tide of the past year, on the 19th of September last, was at Harwich 3 feet 9 inches, and at Sheerness 3 feet 6 inches below Trinity standard, while at the London Docks it was 1 foot 7 inches above that standard; the high water of that day in London being relatively 5 feet 4 inches and 5 feet 1 inch higher than at Harwich and at Sheerness. During the last two years the high water had been abnormally raised, as also the low water, due to the vast quantity of land water from the exceptionally large rainfall.

The public importance of this question was evident, when the sanitary character of the river was considered, making London (besides being the richest) one of the most healthy and beautiful cities in the world. The river was also the carrier of a commerce now amounting to nearly 9 million tons annually, which had been doubled in 20 years. The accumulated causes of tidal development, to which reference had been made, produced results of comparatively slow and gradual operation, though they were becoming more and more marked every year. During the last half century these causes had added about 33 per cent. to the above-bridge tidal volume, operating twice every 24 hours; thus showing the altered condition of the river, and the great improvement thereby effected, attended, however, by the lesser evils arising from the non-embankment of the low-lying portions of the Metropolis, and which, as these tidal improvements were developed, would be intensified year by year, and must demand a comprehensive remedy.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The week just ended has been characterized by much quietude throughout, in almost every branch of the iron trade. This has doubtless resulted in a great measure from the effects of the Russo-Turkish war, aided by the feeling of financial insecurity, which seems to have taken possession of the community during the past few weeks or so. At the same time there can be no doubt that, as the war progresses, some of the local branches of industry may possibly assume more activity, especially those devoted to the manufacture of armour plates for vessels of war or land forts, steel for bayonets or swords, and steel castings for the tubes of ordnance. In none of these particulars, however, has there, as yet, been any especial movement since the outbreak of war.

The pig iron market has ruled quiet so far, and some of the North Lincolnshire brands of forge and foundry iron of this class have declined in value to the extent of 1s. to 1s. 6d. per ton, notwithstanding the appreciably higher figures quoted for Scotch makers brands. A good deal of iron ore is coming into this locality from the mid-Lincolnshire mines near Lincoln. It is used for mixing with the black band ores of the South Yorkshire district, and is said to answer very well. In the merchant and manufactured iron branches there is very little change, and so much quietude that there is hardly any employment for the machinery at most of the works within 20 miles of this town. Some of the "limited" companies engaged in this branch are known to be in a very awkward predicament.

The pits throughout the South Yorkshire coal-field are, for the most part, engaged only for three or four days weekly, yet I am told that the miners now get as much coal in that limited time as they did in a full week three or four years ago. Low wages have had the effect of making

them more industrious, and the police reports plainly demonstrate that they are far more orderly than when their wages were so much higher. The demand for steam coal is fairly steady, and is likely to receive a very considerable impetus now that the Baltic has become navigable as far as Cronstadt and St. Petersburg. House coal, too, is moving off tolerably well, owing to the unusual coldness of the weather. Prices of all kinds of fuel, however, are quiet, and not likely to be increased.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The gas coal season is now beginning to open, and inquiries from gas companies are coming into the market; but as yet business is not being done, and quotations are not out to afford any reliable basis as to the prices which will be asked for contracts. So far as the general aspect of the coal trade is concerned, there is no material change to notice since my last report. In one or two cases there has been a little giving way in the price of best coal; the continuation of the cold weather, and the prospects of a strike in South-West Lancashire, are keeping the market very steady, and stocks are not accumulating. Common classes of coal, suitable for brick-making purposes, are in pretty good demand, but generally this class of fuel is a drug, and burgy is plentiful in the market. Slack continues scarce, and rather higher prices are being asked in some quarters. The average pit quotations are 9s. 6d. to 10s. 6d. per ton for good Arley; 8s. 6d. to 9s. for Pemberton four-feet; 6s. 6d. to 7s. for common coal; 5s. to 5s. 6d. for burgy; and 4s. to 5s. per ton for slack.

The shipping trade is still dull, and extremely low prices have to be accepted to secure orders, owing to the keen competition for any cargoes that are placed in the market.

In the iron trade there is still only a very limited amount of business passing, and the excitement which has been manifest in other markets has had no material effect here, except that holders of north country brands have not been quite such keen sellers as they were a fortnight or so back. There have been a few sales of Lancashire iron, but still the orders which makers are securing are not sufficient to replace those which are fast running off, and stocks are accumulating. Prices both of Lancashire and Middlesbrough brands of pig iron are without change. The finished iron trade shows no improvement, and very few orders are coming into the hands of either forge proprietors or founders. Lancashire bars are still offered at £6 15s., and Staffordshire bars at £6 15s. to £6 17s. 6d. per ton.

Several of the late partners in the Darwen Iron Company have, I understand, succeeded in their efforts to form a new company, and the furnaces have again been blown in.

The proposed reduction of wages in South-West Lancashire threatens to lead to a stoppage of the work. The masters having declined to meet the representatives of the men, a meeting of the miners is being held in Manchester this week, to decide upon the course to be adopted when the notices expire on the 17th inst.

THE COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The large fleets of coal-laden vessels which had crowded the northern coal ports the previous fortnight were all got to sea by Wednesday of last week. A great many cargoes of coals must have arrived in the southern ports by sailing vessels. Coal rates by steamers to the Mediterranean, which rose so rapidly on Saturday week—an advance equal to £9 a keel in the fortnight—came down £2 a keel last week; outward freights to Cronstadt, which had had a rise, likewise fell about 15s. a keel last week. In consequence of the demand there has been for steamers for the Baltic, and from the number which have been taken out of the coasting trade, freights to London by steamers have gone up about 6d. per ton, with a corresponding rise to other ports.

The shipments of best gas coals coastwise and abroad have been pretty good. Some contracts for medium qualities of gas coal have been made for the Continent. The best gas collieries are very well employed. Second-class gas collieries continue to do moderately. The demand for steam coals improves. Shipments are better, but there is no alteration of prices. The proposed reduction of the wages of the Northumberland miners will go to arbitration.

The iron trade of Cleveland and the district has been somewhat firmer. There has been an improved demand for pig iron for shipment, coastwise and abroad.

The chemical trade of the Tyne is extremely depressed. Prices have been getting lower. General manufacturing business is dull. The iron shipbuilding and marine engine building trades are active. Housebuilding in this district shows a considerable falling off.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

With reference to the Aitken and Young patent process of enriching gas of low illuminating power, a certain amount of misapprehension exists, which it may be well to correct before it becomes thoroughly stereotyped in the minds of gas managers and other persons. It has been publicly stated, with some degree of reserve, that Mr. Young is the originator of the process; but I am in a position to say that, with his usual modesty, this gentleman disclaims that position, and does not hesitate to say that to Mr. Aitken belongs the priority of the suggestion which lies at the foundation of the process. I believe, however, Mr. Young was also upon the same track as Mr. Aitken, when they were of necessity brought together in gas matters, in consequence of the death of the late Mr. Cusiter. The private history of the early suggestions and experimental investigations, which led to the patent process referred to, is one of very great interest; but it is undesirable that I should enlarge upon it in the meantime. It is well known to a number of persons that Mr. Aitken has long given attention to the question of the application of heat to bituminous minerals in closed chambers, and that he always brings a large amount of scientific knowledge and practical shrewdness to bear upon any manufacturing investigations in which he may be engaged.

In accordance with the notice previously given, the consideration of Bailie Wood's motion before the Dumfries Town Council, for the acquisition of the gas-works of that town, under the provisions of Sir Windham Anstruther's Gas Act, ought to have been considered at the monthly meeting, held last Friday; but it was eventually found desirable to postpone it till the next meeting.

The Police Commissioners of Alloa met on Monday, the 30th ultimo, for the purpose of taking further action in connexion with the adoption of the Burghs Gas Supply (Scotland) Act. The town-clerk reported that he had taken the preliminary steps with regard to the adoption of the Act, and that no objection had been lodged against carrying into effect the resolution recently come to by the Commissioners, in consequence of which he said the next steps for them to take was to apply to the sheriff to authorize such resolution to be registered in the Sheriff Court books of the county. When that was done the provisions of the Act would at once come into force, the date of registration being held as the date of the adoption of the Act. He was then instructed to proceed with the registration in accordance with the statute.

Dr. Wallace's report upon the quality of the Glasgow gas for the week ending the 28th of April shows that the average illuminating power ranged from 25·89 candles to 28·67 candles, the minimum varying from 25·00 candles to 28·39 candles. The highest maximum was noticed at the West Street (Tradeston) station; it was 29·05 candles.

The following statement refers to the illuminating power of the Perth gas during the same week. In three experiments with sperm candles these results were obtained:—Maximum light, 28·96 candles; minimum, 26·37 candles; average, 27·85 candles.

Mr. Alexander Mackellar, secretary to the Greenock Corporation Gas Commissioners, gives the following report upon the quality of the gas supplied in that town during the month of March, as made up from observations at the gas office:—

No. of Experiments.		Durability in Minutes. 4-inch Flame.
25	Minimum	66·00
	Maximum	71·00
	Average	68·68
	Photometer.	
25	Minimum	26·68 candles.
	Maximum	29·87 "
	Average	28·28 "

Average temperature of gas while testing, 56°. The gas was free from sulphur and other impurities.

Mr. Dalziel, manager of the Kilmarnock Gas-Works, has just secured provisional protection for his invention of a new form of gas-meter, the same as was exhibited by him at the Linlithgow meeting of the West of Scotland Association of Gas Managers, held on Thursday week. Unfortunately, there was not time on the occasion to hear a formal description of it, or to examine into its merits.

At the ordinary meeting of the Glasgow Town Council held last Thursday, the Gas Committee's minutes were submitted, from which it was seen that measures were being taken to have new premises erected for use as a gas and meter testing office. The premises in Alston Street, which have hitherto been occupied as a gas-testing station, and for repairing meters, &c., are required for the new central Caledonian Railway Station. A discussion on the subject took place, but the question as to the selection of a site was referred back to the Gas Committee.

The Dundee Gas Commissioners held their monthly meeting last Wednesday, when it was announced that contracts had been concluded for the supply of 26,500 tons of coal. With reference to the supply of gas to Invergowrie, the Finance Committee reported that they were in favour of the supply being continued from the Dundee works, on the understanding that the price should be 1s. above the Dundee prices for next year, on the footing of the consumption not falling below what it is at present, and that the price remain at that rate for another five years.

The first start was made with the Dunfermline Water-Works by Messrs. Stewart and Creber last Monday, close to the village of Saline. A good stretch of the track is already opened, and on Thursday the first pipe was safely laid.

At a meeting of the St. Andrew's Police Commissioners last Wednesday evening, notice was given of a motion for the next meeting for the introduction into St. Andrew's of a more abundant supply of water from a higher level than at present.

A good deal of firmness has been shown in the Glasgow pig iron market during the past week, and an extensive business has been done. The highest price paid on Friday was 55s. 8d. cash; but lower rates were quoted in the afternoon.

No change of any importance has arisen in the local coal trade. The shipping department is still active.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

1644.—CUTLER, S., Millwall, London, "Improvements in apparatus used in the purification of gas." April 27, 1877.

1645.—MORRIS, F., Brentford, and CUTLER, S., Millwall, London, "Improvements in condensers." April 27, 1877.

1668.—HAZLEHURST, G. S., Runcorn, Chester, "Improvements in apparatus for condensing noxious and other gases and vapours." April 30, 1877.

1677.—FRENCH, J., Commercial Street East, London, "Improvements in pump-valves." April 30, 1877.

1698.—LIDDON, J. J., Islington, and SIMMONDS, F. H., Goswell Road, London, "Improved valve-cocks or taps." May 1, 1877.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

4563.—KELEN, L. V. DER, Brussels, "Improvements in gas-stoves." Nov. 25, 1876.

196.—GIROUD, H., Paris, "Improvements in rheometric regulators for gas-burners." Jan. 15, 1877.

686.—COLE, J., Kilburn, London, "Improvements in the method of and means or apparatus for extinguishing lamps." Feb. 20, 1877.

688.—HUNT, C., Birmingham, "Improvements in gas-meters." Feb. 20, 1877.

765.—BOULTON, M. P. W., Tew Park, Oxford, "Improvements in apparatus for producing heat by the combustion of inflammable gases or vapours." Feb. 24, 1877.

857.—BARKER, E. D., Bedford Row, and HARRIS, A. G. R., Dorset Square, London, "Improvements in ball-valves and other draw-off valves." March 3, 1877.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1260.—MOULE, Rev. H., "Improvements in the production and manufacture of gas." April 11, 1874.

1279.—PORRI, J., and LEIGH, E., "Improvements in apparatus used in the manufacture of gas." April 14, 1874.

1286.—LAKE, W. R., "Improvements in double-acting lift and force pumps." April 14, 1874.

1308.—GOTTHEIL, R., "Improvements in apparatuses for measuring the supply of water passing through pipes." April 16, 1874.

1336.—THOMPSON, N., "Improvements in means for connecting together pipes or tubes, and for connecting cocks, tubes, or pipes to other articles." April 17, 1874.

1390.—CRAWFORD, A., "Improvements in water-closets, and in waste-preventing water supply apparatus." April 22, 1874.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS;
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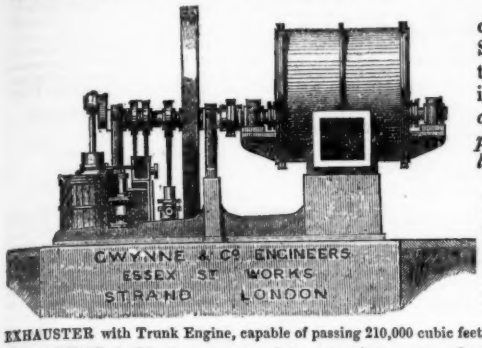

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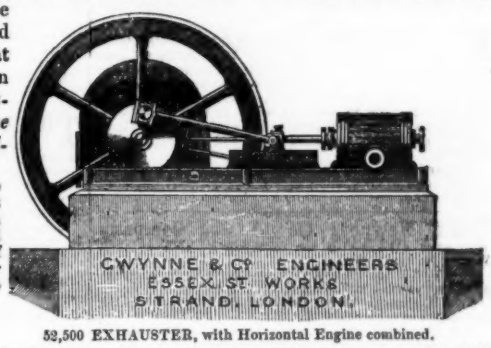

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Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure. Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

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WANTED, by a Lancashire Manufacturing Chemist, large or small quantities of strong Gas AMMONIACAL LIQUOR, above 8° Twaddel.
Address No. 353, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a small Gas-Works in Hampshire, a Working MANAGER. Must be well up in the manufacture and distribution of gas, main and service laying, and all fittings in and out the works.
Applications to be sent to Mr. CHARLES W. HASTINGS, 8, Buckingham Street, Adelphi, LONDON, W.C.

WANTED, a situation as Inspector or MANAGER of the outdoor department. Aged 32. Has a thorough knowledge of the distribution and measurement of gas, including house-fitting. Eight years with a London Company.
Address INSPECTOR, 38, Tavistock Terrace, UPPER HOLLOWAY.

WANTED, by the Stratford-upon-Avon Gas Company, a Main and Service Layer, Meter Inspector and Fixer, and to make himself generally useful on the works. One who understands smithing preferred. To a steady and industrious man the situation would be permanent. Wages 30s. per week.
Apply with references to J. S. CHANMER, Manager.

WANTED, an experienced Manager to take charge of the Gas-Works of the Borough of Macclesfield. Annual make about 90 millions. Salary £200 per year. He will be required to devote the whole of his time to the duties, to superintend the main-laying, services, public lamps, and the entire distribution of gas, as well as the manufacturing department.
Applications, in candidate's own hand writing, with recent testimonials, stating age and experience, to be sent in not later than Saturday, the 12th of May, 1877, addressed to the CHAIRMAN of the Gas Committee, MACCLESFIELD, and endorsed, "Application for Gas Manager."

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A Gentleman of good address, who understands the Trade throughout in detail, and has a large and valuable connexion with Gas Companies, Engineers, Managers, &c., is desirous of entering into an arrangement with any respectable Firm wishing to extend their Trade.
Address No. 361, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO WATER, GAS, AND SANITARY ENGINEERS.

A GENTLEMAN, with twenty-five years experience in Engineering, having an extensive connexion amongst Civil Engineers, Architects, Builders, &c., in London, is desirous of arranging with manufacturers of high-class specialities in the above branches as TRAVELLING REPRESENTATIVE on favourable terms. Highest references can be given.
Address J. E., care of Mr. G. Street, 30, CORNHILL, E.C.

GAS MANAGER WANTED.

THE Directors of the Letterkenny Gas Company are prepared to receive applications from persons fully competent to discharge the duties of MANAGER. He must be a man of experience, who fully understands the management of gas-works, laying mains, services, &c., erecting and repairing street-lamps, repairing meters, and setting retorts on the most approved principle. He must be able to design and carry out any extensions and alterations that may be required.
The Manager must also have a practical knowledge of consumers gas-fittings; he will be required to collect the accounts, and to keep the necessary books at the works.
Salary £80 per annum, with house, fuel, light, and small garden.
Applications, with testimonials, to be in my hands at or before noon on Friday, the 11th inst.
JOHN STOREY, Secretary.
Letterkenny, May 1, 1877.
P.S.—The Manager may, by arrangement with the Directors, augment his salary by profits from gas-fittings, plumbing, &c.

TO GAS COMPANIES.

WE beg to call attention to our special STEATITE BURNERS for Street Lamps. Sample gross 8s. Quotations for quantities.
Messrs. TINDALL AND TELLING, Gas Apparatus Works, 74, Wynford Road, Penton Street, LONDON, N.

TO BE SOLD, Four Cast-Iron Purifiers, 6 ft. square, with hydraulic centre-valve; also Ten 18-in. round, and Sixty-two 15-in. round Retort Mouthpieces, and Forty-seven 6-in. H-Pipes.
Apply to W. WINSTANLEY, Manager, Gas-Works, NEWCASTLE-UNDER-LYME.

GAS PLANT FOR SALE.

THE Directors of the Phœnix Gaslight and Coke Company invite TENDERS for the following PLANT:—
Thirty-five 15 in. Round Mouthpieces, with wrought-iron lids, ears, screws, and collars complete.
Six Lengths of Cast Iron U-shaped Hydraulic Main, with thirty-five dips and the accompanying bridge-pipes, ascension-pipes, and ascension-bends.
Set of 8 in. Vertical Condensers, scrubber and washer combined, 8 ft. by 4 ft. diameter.
One Burton and Waller's 5000 cubic feet an hour Engine and Exhauster combined, with governor, self-acting bye-pass, and valves, complete and in good condition. New in 1872.
One Steam Boiler, 9 ft. by 3 ft. 4 in. diameter, with safety-valve, gauge-cocks, &c., attached.
Three Purifiers, 9 ft. by 4 ft. 6 in. by 3 ft. 6 in.; one Purifier, 6 ft. by 4 ft. by 4 ft., with lifting gear, connexions, and 12 ft. 6 in. valves complete.
One 5000 feet an hour Crosley's Station Meter, with connexions and 3 ft. 8 in. valves.
Two Gasholders, in excellent condition, made by Waller, to contain each 15,000 cubic feet, 40 ft. diameter, with 6 in. inlets and outlets and 4 ft. 6 in. valves.
One 6 in. Governor, connexions, and valve.
Tenders to be sent in to the Secretary, Mr. I. A. Crookenden, No. 70, Bankside, Southwark, on or before Wednesday, the 16th inst., for the whole or any part of the plant.
For any further particulars, apply to Mr. P. J. WATES, Engineer, Phœnix Gas-Works, GREENWICH.

GASHOLDER FOR SALE.

TO BE SOLD CHEAP, in consequence of the tank being wanted for another purpose, a GASHOLDER about 30 ft. in diameter and 10 ft. deep. To be sold, as it now stands, at any reasonable price. Is in good condition.
Apply to Mr. W. T. HEWS, Gas-Works, HENLEY-ON-THAMES.

READING GAS COMPANY.

FOR SALE, as they now stand, and at any reasonable price, as the ground upon which they stand is wanted, four 12-ft. square Cast-Iron PURIFIERS, with centre-valve and connexions, grids, tee bars, &c., complete.
Apply to Mr. E. BAKER, Engineer, Gas-Works, READING.

WALTON-ON-THAMES AND WEYBRIDGE GAS COMPANY.

FOR SALE, Three Engines and Ex- hausters (Two by Gwynne, and one by Waller) for 15,000 feet per hour. Being about to be replaced by larger ones.
Can be seen at the Works, Walton-on-Thames, or particulars can be had of Mr. GEORGE ANDERSON, 35A, Great George Street, WESTMINSTER.

FARNWORTH AND KEARSLEY GAS COMPANY.

ON SALE, a Station-Meter with 8-in. connexions, and One Steam-Pump with 4-in. steam-cylinder and 2½-in. pump.
Also Four Covers to suit 12 ft. square purifiers. In good condition.
Any further information may be obtained by making application at the Works, Middle Street, Farnworth, near BOLTON.

FOR SALE.

A Set of 8-in. Vertical Condensers, with tar-box and all connexions complete, containing about 180 ft. of pipes.
Also a SCRUBBER, 12 ft. high, 5 ft. diameter, with reversing valve.
The above are nearly new (only been in work six years), and are now removed to make room for larger.
May be seen and price obtained on application to H. and F. BAILEY, Engineers, EAST RETFORD.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—
A 6-h.p. Patent Trunk Engine. (Beale.)
Exhauster to pass 15,000 feet per hour. (Beale.)
An 8-h.p. Grasshopper Engine. (Easton and Amos.)
Exhauster, 20,000 ft. per hour. (Beale.)
Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.
Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24 in. by 6 in., with tar-boxes, dips, and syphons.
A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.
May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.
Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

TO TAR DISTILLERS AND OTHERS.

TO BE LET ON LEASE, or the Interest SOLD, a very handy TAR-WORKS in London. In good order, and capable of working nearly a million gallons per year. Water frontage.

Address No. 362, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GASHOLDERS.

FOR SALE, Two Telescopic Gasholders. One 50 ft. by 16 ft., the other 70 ft. by 20 ft., each complete, with cast-iron tanks, columns, girders, and inlet and outlet pipes, valves, &c., both of modern construction, in good condition, and made by Messrs. Piggott and Co., of Birmingham. To be seen at work at the Gas-Works, Birkenhead. Cause of removal to make room for extensions.

To be sold a bargain, taken down and re-erected ready for work.

For particulars apply to ASHMORE AND WHILE, STOCKTON-ON-TEES; or to view, apply to Mr. CALLOW, Gas Engineer, BIRKENHEAD.

THE Newport (Mon.) Gas Company have FOR SALE the following PLANT at their Works, Newport, Mon.:—

Two Cylindrical Boilers, 13 ft. by 4 ft., with fittings complete, and steam-pipes to engines.

Two Horizontal Engines, each cylinder 9½ in. diameter, and stroke of each 1 ft. 6 in.

Two Beale's Exhausters, made to pass 20,000 cubic feet per hour each, with regulators and bye-pass.

The above are in good order, have been working during the past winter, and are now offered for sale because larger ones have been fixed.

They can be seen at the Works, Mill Street, Newport, Mon.

THOMAS CANNING, Engineer.

April 20, 1877.

THE Chepstow Gas Company desire to receive TENDERS for the purchase of their TAR and AMMONIACAL LIQUOR, together or separately.

For particulars and forms of tender, address Mr. WILLIAM DORÉ, Secretary for the Company.

TO TAR DISTILLERS, DYE MANUFACTURERS, AND OTHERS.

THE Directors of the Swansea Gaslight Company are prepared to receive TENDERS for the purchase of the TAR produced at the Gas-Works, Swansea.

For information as to terms and conditions, apply to the undersigned,

THORNTON ANDREWS, Secretary and Manager.

Swansea, April 24, 1877.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the St. Helen's Gas Company are prepared to receive TENDERS for the TAR produced at their Works (into which there is a siding from the London and North-Western Railway), for a term of One or Two years, commencing on the 1st of July next.

Sealed tenders, properly endorsed, to be sent in not later than Wednesday, May 16, addressed to the Secretary, Mr. E. DYSON, Gas Office, St. Helen's, LANCASHIRE.

The Directors do not bind themselves to accept the highest or any tender.

ELLAND-CUM-GREETLAND GAS COMPANY.

THE Directors of this Company are pre- pared to receive TENDERS for the purchase of their surplus TAR and AMMONIACAL LIQUOR, for One or Three years, from the 21st day of November next.

The Directors do not bind themselves to accept the highest or any tender.

Sealed tenders to be sent to the undersigned, from whom all particulars may be obtained, not later than Thursday, the 24th of May.

W. A. WALKER, Secretary, &c., to the Company.

Gas Company's Offices, April 28, 1877.

TO COAL PROPRIETORS.

THE Directors of the Ashton Gas Com- pany are prepared to receive TENDERS for the supply of 5000 tons of CANNEL, to be delivered during the next 12 months.

Further particulars may be obtained on application to the undersigned, to whom tenders must be sent not later than Saturday, the 19th inst.

DAVID CLARKE, Manager.

Gas Offices, Ashton-under-Lyne, May 5, 1877.

THE Directors of the Cheltenham Gas- light and Coke Company invite TENDERS for the supply of the best quality of CANNEL and COAL for making gas, for One or Three years from the 1st day of July next.

Quantities and conditions of contract can be had on application to the undersigned, to whom tenders must be sent on or before the 31st inst.

The Directors do not bind themselves to accept the lowest or any tender.

R. O. PATERSON, Engineer.

Gas-Works, Cheltenham, May 5, 1877.

THE Farnworth and Kearsley Gas Com- pany are prepared to receive Plans and Specifications and Tenders for the supply and fixing complete of Two PURIFIERS, 20 ft. by 18 ft., also 24 ft. by 18 ft., and 5 ft. deep, with all necessary valves and connexions.

Also for a cast-iron CISTERN, 22 ft. 9 in. by 30 ft., and 4 ft. 6 in. deep.

Contractors to state the time in which they will undertake to complete the respective works.

No allowance for plans, &c., nor will the Directors pledge themselves to accept the lowest or any tender.

Tenders to be sent in on or before Wednesday, the 23rd inst.

Any further information may be obtained by making application at the Works, Middle Street, Farnworth, near BOLTON.

PATRONIZED BY THE ROYAL ARSENAL, WOOLWICH.

FERGUSON, Builder and Contractor. Kite method of Repairing Church Spires and High Chimneys. Chimneys straightened, pointed, and hooped. Old Chimneys pulled down by a process requiring no scaffolding or stoppage of work, by competent workmen, under personal supervision. For Lightning Conductors—cheapness and method of fixing—apply to C. R. FERGUSON, 10, Canal Road, MILE END.

TO BUILDERS AND CONTRACTORS.

THE Broseley Gas and Coke Company, Limited, invite TENDERS for the construction of a GASHOLDER-TANK on their premises at Jackfield, Salop, 46 ft. 6 in. diameter, and 18 ft. deep, in accordance with plans and specifications to be seen at the Office of the Company, or copies of which may be had of J. Annan, Esq., Wolverhampton.

Tenders to be sent in not later than the 19th of May to the undersigned, endorsed "Tender for Gasholder-Tank."

The lowest or any tender not necessarily accepted.

JOHN FOUNTNEY, Secretary.

Barratt's Hill, Broseley, May 7, 1877.

TO GASHOLDER MAKERS.

THE Broseley Gas and Coke Company, Limited, invite TENDERS for the erection of a Single-Lift GASHOLDER, 45 ft. diameter and 18 ft. deep, on their premises at Jackfield, Salop, in accordance with plans and specifications to be seen at the Office of the Company, or copies of which may be had of J. Annan, Esq., Wolverhampton.

Tenders to be sent in not later than the 19th of May to the undersigned, endorsed "Tender for Gasholder."

The lowest or any tender not necessarily accepted.

JOHN FOUNTNEY, Secretary.

Barratt's Hill, Broseley, May 7, 1877.

THE LLANDUDNO IMPROVEMENT ACTS, 1854 & 1876.

TENDERS FOR GAS COALS.

THE Llandudno Improvement Commis- sioners invite TENDERS for the supply of GAS COALS.

The tenders to be for One, Five, or Seven years, at the option of the Commissioners.

To be delivered in such quantities and at such periods as may be required.

The quantity required is estimated at from 1300 to 1400 tons per annum.

Parties tendering to give separate prices for Cannel Coal and Best Gas Coal, delivered carriage paid at the London and North-Western Railway Station, Llandudno.

Sealed tenders, endorsed "Tender for Gas Coal," to be delivered to the undersigned before 10 a.m. of May 15th prox.

The Commissioners do not pledge themselves to accept the lowest or any tender.

THOS. T. MARKS, A.I.C.E.,
Clerk to the Commissioners.

April 30, 1877.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is hereby given that the HALF-YEARLY ORDINARY MEETING of the Proprietors of the Imperial Continental Gas Association will be held at the City Terminus Hotel, Cannon Street, London, on TUESDAY, the 29th inst., at Two o'clock in the afternoon precisely, when a Report will be made to the Proprietors, a Dividend declared for the half year ended the 31st of December, 1876, and the usual ordinary business of such meeting transacted.

Notice is also hereby given that the Transfer Books and the Register of Shareholders will be closed on Tuesday, the 15th inst., and will remain closed until after the Half-Yearly Ordinary Meeting on the 29th inst.

ALBERT F. JACKSON, Secretary.

No. 30, Clement's Lane, Lombard Street,
London, May 7, 1877.

By order of the Board.

TO COLLIERY PROPRIETORS AND OTHERS.
TENDERS FOR COAL.

THE Directors of the Merthyr Tydfil Gas Company solicit OFFERS for the supply of best quality large screened GAS COAL for a period of One, Two, or Three years, to be delivered at their Gas-Works, Picton Street, Merthyr Tydfil, free of all costs of carriage, terminal charges, and haulage at Merthyr between the station and works, in such quantities as the Manager may from time to time require.

Tenders, endorsed "Coal," to be addressed to the Secretary (from whom particulars may be obtained), on or before Tuesday, the 5th day of June next.

JOHN L. COCKER, Secretary and Manager.

Gas Offices, Picton Street,
Merthyr Tydfil, May 5, 1877.

BOROUGH OF HALIFAX.

TO COLLIERY PROPRIETORS.

THE Gas-Works Committee of the Halifax Corporation are prepared to receive TENDERS for the supply of 22,000 tons of GAS COALS and 3000 tons of CANNEL, to be delivered upon the railway siding at their Gas-Works. The whole to be supplied before April 30, 1878.

Specifications and forms of tender may be obtained on application to Mr. Wm. Carr, Engineer, Gas-Works, Halifax, and tenders, properly endorsed, must be sent to me on or before Wednesday, May 16, 1877.

By order,

A. C. FOSTER, Town-Clerk.

Town-Hall, Halifax, April 21, 1877.

Now ready, price One Shilling, No. 6 (to be continued Monthly) of

A TREATISE ON THE SCIENCE & PRACTICE OF THE Manufacture and Distribution OF COAL GAS.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET,
OR OF ANY BOOKSELLER IN TOWN OR COUNTRY.

For the convenience of persons resident in remote districts, arrangements have been made by the Publisher to forward the "Treatise" by Post, securely packed on a roller, at the cost of the number and postage only—viz., 1s. 2d. Monthly, or 7s. for the Half Year.

B. GIBBONS, JUN.,

DIBDALE FIRE-CLAY, BRICK, AND GAS-RETORT WORKS,

STOURBRIDGE (Established 1834),

MANUFACTURER OF EVERY DESCRIPTION OF

Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts,

A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular .	14 in.,	15 in.,	16 in.,	18 in.
Ovals . .	17 in. × 14 in.,	17 in. × 15 in.,	20 in. × 15 in.,	21 in. × 15 in., &c.
D's. . .	14 in. × 14 in.,	15 in. × 12 in.,	15 in. × 13 in.,	17 in. × 14 in., 18 in. × 13 in.
	18 in. × 15 in.,	20 in. × 16 in.,	22 in. × 14 in.,	24 in. × 14 in., 24 in. × 15 in., &c.

Special attention given to the execution of Export Orders.

J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

J. EDMUNDSON & CO.,

19, GREAT GEORGE STREET, WESTMINSTER,
LONDON, S.W.,

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS.

CONTRACTORS FOR THE

ERECTION OF GAS-WORKS, GAS-FITTINGS, &c.,

FOR TOWNS, COUNTRY MANSIONS, &c.

Estimates given free of Charge.

Now ready.

THE GAS & WATER COMPANIES DIRECTORY
FOR THE YEAR 1877,

EDITED BY

CHARLES W. HASTINGS,

8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.,

CONTAINS

An Alphabetical List of Towns in England having Gas or Water Companies.
Date of Formation of the Company.
If Incorporated under Special Act of Parliament, and the date of such Act or Acts.
If under any of the Limited Liability Acts.
Amount of Share Capital.
Name of Chairman.
Name of Engineer or Manager.
Name of Secretary.
If Let on Lease, Name of Lessee.
If a Private Venture, Name of Owner
If Purchased by the Corporation (and in cases where possible the date of such Purchase), or if the Property of the Local Authorities.
Population of all Towns.
Railway Communication, and the Distance from London.
Special Notice is taken of all the Members of the "British Association of Gas Managers."

THIS WORK IS UNDER THE PATRONAGE OF ALL THE LEADING GAS & WATER ENGINEERS AND SECRETARIES OF THE METROPOLITAN & PROVINCIAL COMPANIES.

Price 5s. in Cloth Covers; by post, 5s. 2d. | Price 3s. 6d. in Paper Covers; by post, 3s. 8d.

PUBLISHED BY MESSRS. MARCUS WARD & CO., OF LONDON AND BELFAST.

J. & J. BRADDOCK,

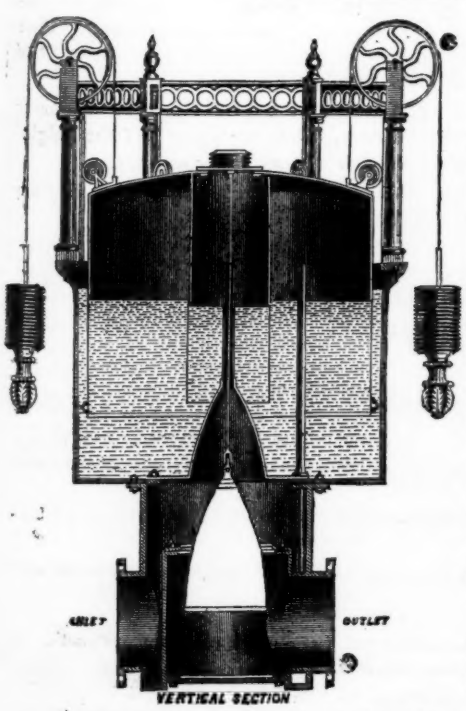
GLOBE METER-WORKS,

OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

TENDERS FOR GAS COAL.

THE Bangor Water and Gas Company, Carnarvonshire, invite TENDERS for 1400 tons of the best GAS COAL, to be delivered in such quantities, and at such periods as may be required during the Twelve months ending June 30, 1878.

Parties tendering must give full particulars of the Coal offered, and the colliery from which they propose the supply, to be delivered carriage paid at the London and North-Western Railway Station, Bangor.

Sealed tenders, addressed to the undersigned, will be received until the 15th of May next.

DAVID WHITE, Secretary and Manager.

April 21, 1877.

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Bangor Water and Gas Company, Carnarvonshire, are prepared to receive TENDERS for their surplus TAR and AMMONIACAL LIQUOR, for One, Two, or Three years, from the 1st of June next.

The Company will deliver the Tar and Liquor at the Bangor Railway Station, in iron tanks to be provided by the contractor.

The Company do not bind themselves to accept the highest or any tender.

Particulars may be obtained of the undersigned, and the tenders must be sent to me not later than the 22nd of May next.

DAVID WHITE, Secretary and Manager.

STOCKPORT BOROUGH GAS-WORKS.

TO TAR AND AMMONIA DISTILLERS.

THE Gas Committee of the Corporation are desirous of receiving TENDERS for the purchase of the TAR and AMMONIACAL LIQUOR produced at their Works for a period of One, Two, or Three years, commencing the 1st day of July next.

The tenders to state price per ton for Tar, and price per ton for Ammoniacal Liquor, and to be delivered, addressed to the Chairman, on or before Wednesday, the 16th of May, endorsed "Tender for Tar," &c.

Particulars as to quality and quantity may be obtained on application to the Engineer.

By order,

JAS. JACQUES, Engineer and Manager.

Millgate Works, May 4, 1877.

BOROUGH OF BURNLEY.

THE Gas Committee of the Corporation are prepared to receive TENDERS for a supply of the best screened GAS COAL and CANNEL for One, Two, or Three years.

The quantities required for the first year will be 14,000 tons of Coal and 3000 tons of Cannel, to be delivered at the Gas-Works Wharf, on the Leeds and Liverpool Canal. For the second and third years the Corporation will expect to be supplied with any additional quantity they may require at the contract price.

Further particulars may be obtained on application to Samuel Petty Leather, Gas Engineer, Burnley, to whom all tenders, endorsed "Tender for supply of Coal and Cannel," must be sent on or before Wednesday, May 9, 1877.

By order,

A. B. CREEKE, Town-Clerk.

Burnley, April 17, 1877.

TO CHEMICAL MANUFACTURERS, TAR DISTILLERS, AND OTHERS.

THE Chorley Commissioners are prepared to receive TENDERS for the purchase of their surplus TAR and AMMONIACAL LIQUOR for One or Three years from the 16th of October next.

The Commissioners will deliver the goods at the Chorley Railway Station into waggons to be provided by the Contractor.

Particulars may be obtained on application to Mr. Thomas Hamer, Gas Manager, Chorley, Lancashire.

The Commissioners do not bind themselves to accept the lowest or any tender.

Sealed tenders to be sent to the undersigned not later than the 15th of May next.

By Order,

RICHARD JACKSON, Solicitor,
Clerk to the Chorley Commissioners.

Dated the 6th of April, 1877.

TO COAL MERCHANTS, SHIPOWNERS, AND OTHERS.

THE Directors of the Torquay Gas Company are prepared to receive TENDERS for the supply of about 5000 Tons (or such other quantity as may be agreed on) of Pelaw Main, Waldridge, Pelton, New Pelton, Peareth, or other approved GAS COAL. About 600 tons per month to be delivered during June, July, August, September, and October, and the remainder at the rate of about 400 tons per month during the succeeding five months.

Tenders to state the price of Coals and freight to Dartmouth, separately and together, and also for delivery into the Company's Works, free of all charges.

Payment by cash for freight on delivery, and by three months bills for the Coals.

Further particulars to be obtained from Mr. Greenfield, the Manager of the Company, Hollacombe, Paignton, and tenders to be sent to the undersigned on or before the 14th day of May next.

By order,

J. KITSON, Secretary.

Torquay, April 23, 1877.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

PAMPHLET ON GAS.

COOKING AND HEATING.
HINTS ON GAS-BURNERS, &c.

For GAS COMPANIES to distribute to their Gas Consumers.

Specimen Copy by post Threepence, from the Author,
MAGNUS OHREN, Gas-Works, Sydenham, S.E.

T. NEWBIGGING,
CONSULTING GAS ENGINEER,
5, NORFOLK STREET, MANCHESTER.

HENRY LYON,
ENGINEER,
AND
CONSULTING GAS ENGINEER,
BARTON HOUSE, opposite BARTON ARCADE,
DEANSGATE, MANCHESTER.

ALFRED LASS,
SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.
The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.
The above forms are registered.
Water Companies Accounts also prepared and adjusted.
CONSULTATIONS.

JOHN ROMANS, C.E., F.G.S.E.,
CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.
GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

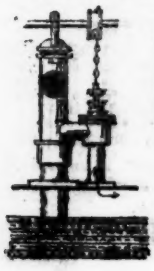
ANALYSIS AND PRICES FORWARDED ON APPLICATION.

YEO'S PATENT ENGINE PACKING
AND IMPROVED YARN FOR
GAS AND WATER PIPE JOINTS.
EPHRAIM YEO, Inventor, Patentee, and Sole Manufacturer of the Patent Excelsior Self-Lubricating Rope Engine Packing, price 1s. 8d. per lb., any size. Carriage paid on ½ cwt. and upwards to any Railway Station in the Kingdom. Best Tarred Spun-Yarn for Gas-Pipe Joints, 28s. per cwt. Best White Ditto, any size, 36s. per cwt. Best Ditto, boiled in Oil and Tallow, 36s. per cwt. Coke Sacks, any length or width, Tarred or Untarred. Carriage paid to any Railway Station in the Kingdom. Address—
E. YEO, NEWTON ABBOT, DEVONSHIRE.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS.
&c., &c.,
SCOTSWOOD FIRE-BRICK WORKS,
SCOTSWOOD-ON-TYNE.

W. HAILES,
FURNACE BUILDER AND RETORT-SETTER,
Contracts for the
BUILDING AND SETTING OF RETORT BENCHES,
In large or small works, at home or abroad;
Also to supply all kinds of
FIRE GOODS AND IRONWORK
Necessary for the Erection of Retort-Beds.
The greatest amount of heat by the smallest possible amount of fuel is the principle of the settings.
ADDRESS:
No. 3, High Street, Brentford, MIDDLESEX.

COPP'S PATENT ANTI-DIP GAS APPARATUS.



Produces from 10 to 20 per cent. more gas of higher illuminating power.
Prevents the deposit of carbon.
Retorts last much longer.
Charges work off quicker.
This simple invention has been in use in many works for the last six months, with the above results.

PRICE 2 GUINEAS EACH.

Testimonials and particulars on application.
Address **WALTER L. COPP,**
WATCHET, SOMERSET.

JOHN HALL AND CO., STOURBRIDGE,
Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

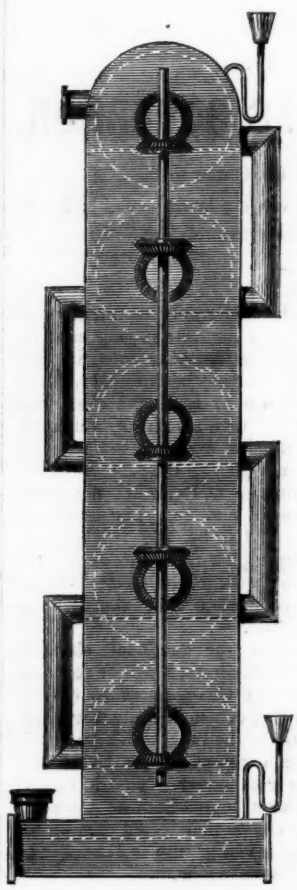
CATHELS'S
IMPROVED RETORT-SETTINGS.
GUARANTEED TO HEAT AND WEAR WELL, WITH GREAT ECONOMY OF FUEL.

Coloured lithograph copies of WORKING DRAWINGS of Beds of One to Seven Retorts (so clearly arranged and fully shown as to be easily understood by any retort setter or bricklayer) having been made of these valuable settings, they can now be supplied with detailed SPECIFICATION immediately on receipt of orders.

APPLY TO
MR. THOS. NEWBIGGING,
CONSULTING GAS ENGINEER,
5, NORFOLK STREET, MANCHESTER.

GEORGE ANDERSON,
GAS AND CONSULTING ENGINEER,
35A, GREAT GEORGE STREET,
WESTMINSTER, S.W.

ANDERSON'S
PATENT
COMBINED WASHER AND SCRUBBER.



TESTIMONY OF ITS ACTION.

The Gas-Works, St. Albans,
April 27, 1877.

DEAR SIR,

Your Brush Scrubber has been in action here for four months.

It removes the whole of the ammonia from the gas, so that it will not discolour moistened turmeric paper.

The brushes cause no appreciable increase of pressure, and there is no repumping of liquor. Clear water run in at top, issues from the bottom fit to proceed to the sulphate-house.

It performs its work more efficiently than the tower scrubber I have, while only about half the height, and not one-fourth its weight or capacity.

My purifiers also last much longer before they are foul than they did previously.

I am, yours truly,
A. F. PHILLIPS.

G. Anderson, Esq.,
35*a*, Great George Street, S.W.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

GAS PURIFICATION.

BAILES & HALLSWORTH,

CONTRACTORS FOR THE

PURIFICATION OF COAL GAS,

BY THEIR

PATENT OXIDE OF IRON COMPOUND.

The material is in use at most of the principal Gas-Works in Yorkshire and elsewhere. It contains considerably less moisture than natural Oxide of Iron. It is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

FOR SAMPLES AND TERMS, ADDRESS—

BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY, LEEDS.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonised were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

THE TYNE COAL COMPANY, LIMITED, OWNERS.

W. RICHARDSON, Fitter,

29, QUAYSIDE, NEWCASTLE-ON-TYNE.

GRIRDROD'S PATENT PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,

Brassfounders, Gauge Injector and Tool Makers,

ALBION WORKS, SALFORD, LANCASHIRE.

THOMAS PROUD,

BROOKFIELD WORKS, 103, ICKNIELD STREET EAST, BIRMINGHAM,

MANUFACTURER OF V WOOD TROUGHING

FOR

PROTECTING AND PRESERVING SERVICE-PIPES.

The Wood Troughing being pickled in creosote or gas tar, and the Service-Pipes laid inside the Trough in a bed of gas tar and sand, pitch, or asphalte, the Pipes will last very considerably longer than if laid in the ordinary way.

Made in Large Quantities, to any Length, by Steam Machinery, at Minimum Cost.

GAS PURIFICATION.

H. O. COOKE & CO.,

OXIDE MERCHANTS,

79, MARK LANE, LONDON, E.C.,

Are now supplying the best natural Oxide of Iron that has yet been brought into the market.

HENRY GREENE & SON,

GAS AND HOT WATER ENGINEERS,

155, CANNON STREET, E.C.

Manufactory: 19 & 20, NICHOLAS LANE, E.C.

SUN-BURNERS,

With Regulating Valves to obviate down draught.

MEDIÆVAL & OTHER GAS-FITTINGS

For Churches and Domestic Use.

ARCHITECTS' OWN DESIGNS WORKED OUT.

ESTIMATES FREE OF CHARGE.

THE TRADE SUPPLIED.

SOLE CONSIGNEES FOR BRÖNNER'S IMPROVEMENTS IN GAS LIGHTING.

IN THE MATTER OF

BRÖNNER'S

GAS-BURNERS.

HENRY GREENE AND SON, 155, Cannon Street, London, Sole Agents for Great Britain, Ireland, and Colonies, of Brönner's Improvements in Gas Lighting, beg to inform the public that on the 13th of January, 1876, Julius Brönner obtained an injunction in the Court of Session, Scotland, against Donald M'Vean, Gas-Fitter, 14, Newton Street, Glasgow, prohibiting him from in any way advertising or offering for sale as Brönner's Burners, any Burner not manufactured by Julius Brönner, or from in any way inducing the public to believe that the said Donald M'Vean sells or keeps for sale Brönner's Burners, manufactured by Julius Brönner, while such is not the case.

Also that on the 9th of November, 1875, he obtained injunction in the same Court, and in the same terms, against R. M. Brechin and Co., 46, North Hanover Street, Edinburgh.

Also that on the 20th of April, 1875, in a suit in Chancery, before Vice-Chancellor Malins, number 1874, B 365, he obtained injunction against another defendant, in the same terms and on similar grounds.

BOUCK & CO., LIMITED,
TAR DISTILLERS & MANUFACTURING CHEMISTS,
MILES PLATTING, MANCHESTER.

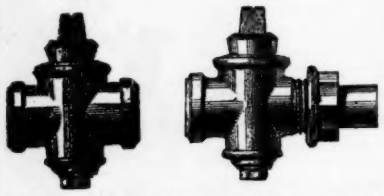
BUYERS OF COAL TAR,
And Crude Products therefrom,
AMMONIACAL LIQUOR, &c.

PLUTONIC CEMENT,
For Jointing and Repairing Retorts and Ovens both in and out of Action.
Used in the principal London and Provincial Gas-Works as a great aid to the economical production of Gas.
WILLIAM RICHARDSON,
GAS ENGINEER.
CHARLES HENRY STREET AND BISSELL STREET, BIRMINGHAM.

LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

MANUFACTORY:
SHORT STREET, LAMBETH, LONDON.

MANN & OWENS' PATENT GAS-VALVE.

EVERY VALVE
WARRANTED TO BE
PERFECTLY
SOUND
AND
GAS-TIGHT.

VALVE, with Indicator for Above Ground. UNDERGROUND VALVE.

The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

SOLE MANUFACTURERS:

S. OWENS AND CO.,
HYDRAULIC AND GENERAL ENGINEERS,
WHITEFRIARS STREET, LONDON, E.C.
PRICES, SIZES, AND FULL PARTICULARS ON APPLICATION.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY
GEORGE HALLETT & CO.,
296, ROTHERHITHE, LONDON, S.E.

CLASS II.

This Paint having been in general use over fifteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

The following Gas Companies in London have used the Paint for years—viz., The Gaslight and Coke, Imperial, Independent, City of London, Commercial, London, and Surrey Consumers.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

SPECIAL DRIERS FOR ANTIMONY PAINT SUPPLIED.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

THE WIGAN COAL & IRON COMPANY,
LIMITED.

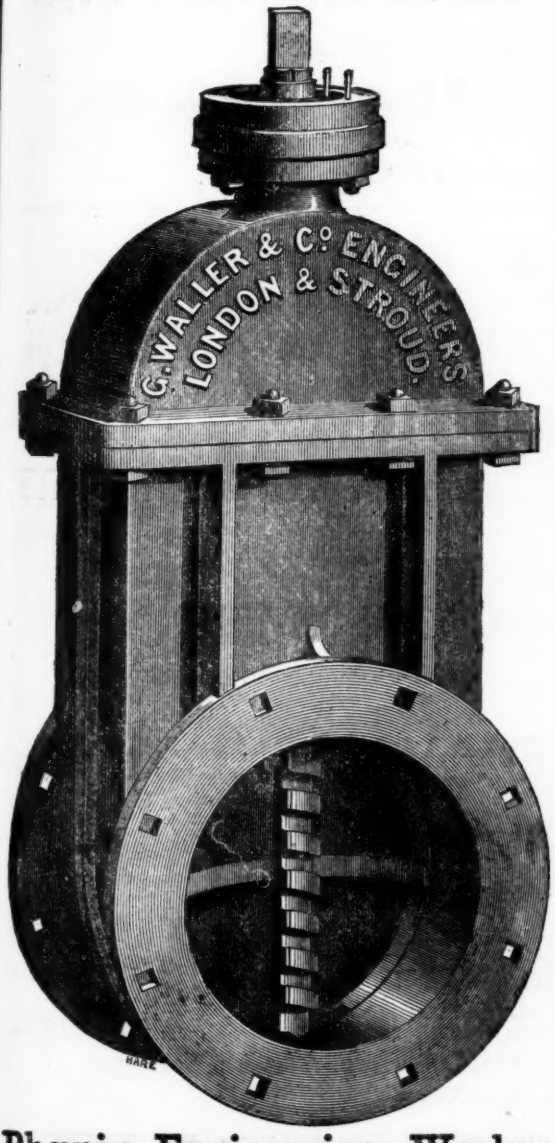
DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;
Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.
N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

GAS PURIFICATION & CHEMICAL Co., LIMITED,
(Successors to JOHN WILLIAM O'NEILL & CO.,)
Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,
CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

GEORGE WALLER & CO.,
GAS ENGINEERS AND CONTRACTORS.

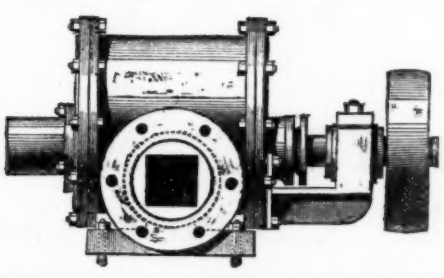


IMPROVED INDEX GAS-VALVE.

These Valves are constructed with Circular Wedged Backs, with the body *in one piece*, and are proved on both sides to 30 lbs. per square inch.

One man can open the largest Valve without gearing, and there are studs on the top of index which can readily be felt in the dark, to ascertain if the Valve is open or shut.

A large stock always on hand. Also good second-hand ones, removed during alterations and extensions of gas-works.



BEALE'S IMPROVED EXHAUSTER,
WITH OUTER BEARING.

Specially made by G. W. & Co. to supersede the old style of driving by counter-shaft.

Phœnix Engineering Works, Holland Street, Southwark, S.E.

JOHN ABBOT AND CO.,

LIMITED,

IRON AND BRASS FOUNDERS,

PARK WORKS, GATESHEAD-ON-TYNE.

London Office: 2, SUFFOLK LANE, CANNON STREET.

Glasgow Office: 54, ST. ENOCH'S SQUARE.

MANUFACTURERS OF ALL DESCRIPTIONS OF

HYDRAULIC MACHINERY,

INCLUDING

ACCUMULATORS, FORCE-PUMPS, CRANES, & LIFTS,

FOR

GAS-WORKS, WAREHOUSES, &c.

IMPROVED HYDRAULIC MACHINERY,

Specially Arranged for Lifting and Lowering Purifier-Covers, &c.

MAKERS OF

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS;

PIPES FOR GAS AND WATER WORKS;

ROOFS, COLUMNS, AND GIRDERS.

DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

THOMAS ALLAN & SONS,

IRONFOUNDERS,

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

BONLEA FOUNDRY, STOCKTON-ON-TEES,

Manufacturers of

CAST-IRON GAS AND WATER PIPES.

SIZES: ¾ to 12 inches at GLASGOW.

„ 1½ to 7 „ STOCKTON.

A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 12s. 6d. from Glasgow.

London Agent: Mr. A. C. FRASER, ST. STEPHEN'S CHAMBERS, TELEGRAPH STREET.

MESSRS. PELOUZE & AUDOUIN'S
NEW
PATENT CONDENSER,

For the Mechanical Condensation of the Liquefiable Matters in Gases or Vapours.

WILLIAM SUGG'S

PATENT

ILLUMINATING

POWER METER

For showing the Illuminating Power of Gas by the observation of one minute.

£26s. 10s. COMPLETE.

THE "LONDON"

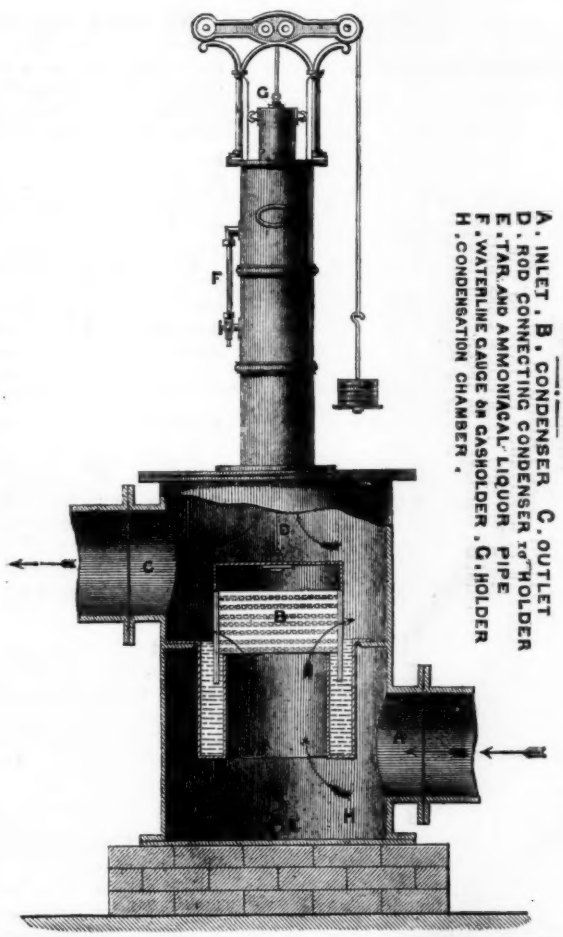
Standard Burner,

"GAS REFEREES MODEL,"

For 14-candle and 16-candle gas, as certified by the Board of Trade, is now ready.

Prices and Description of above will be sent on application.

MESSRS PELOUZE AND AUDOUIN'S
PATENT CONDENSER.



LOWE'S

Jet Photometer

(KIRKHAM & SUGG'S IMPROVED),

Suitable for the English and French systems.

WILLIAM SUGG'S

PATENT

Street-Lamp

METERS

AND

GOVERNORS.

"EVANS"

AND

"LETHEBY"

PHOTOMETERS,

As approved of by the Metropolitan Gas Referees and Standards Department of Board of Trade.

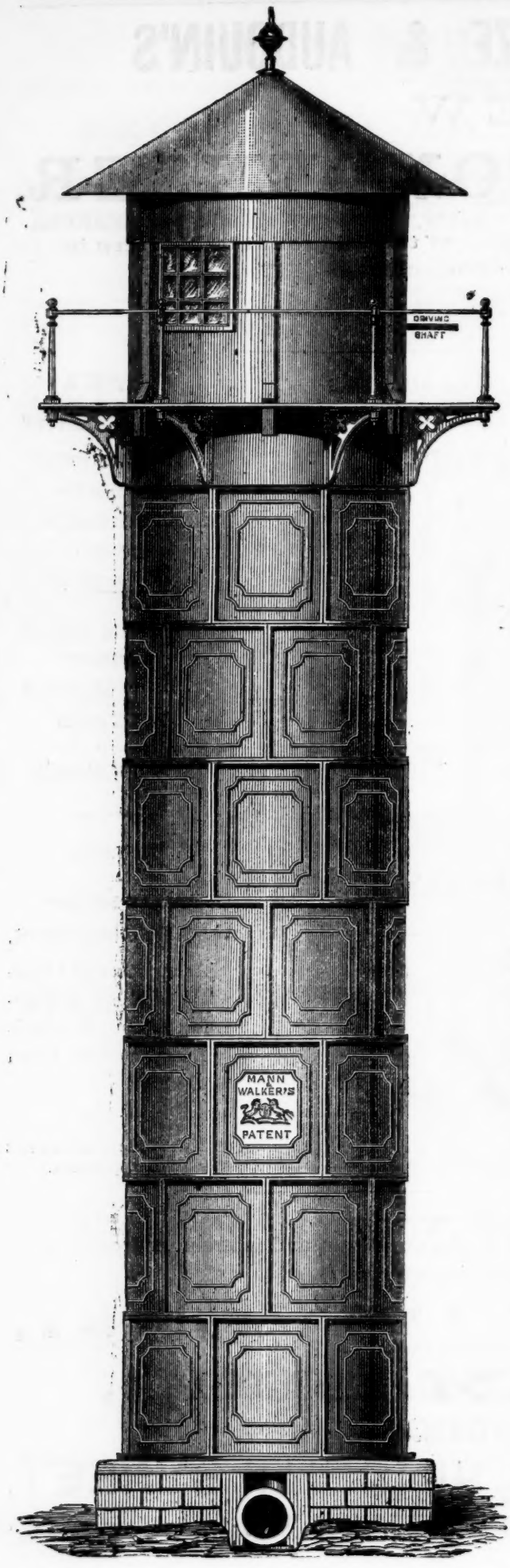
Lists of above will be sent on application.

***** This Condenser is being largely used on the Continent, and is much approved of.**

SOLE AGENT FOR ENGLAND,

From whom Prices and all Particulars may be obtained on application,

WILLIAM SUGG,
GAS ENGINEER,
VINCENT WORKS, VINCENT STREET,
WESTMINSTER, S.W.



C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

TO GAS COMPANIES AND THE TRADE.

J. DEFRIES & SONS,

MANUFACTURERS OF

CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS, VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.

A LARGE STOCK ALWAYS IN HAND OF

IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,

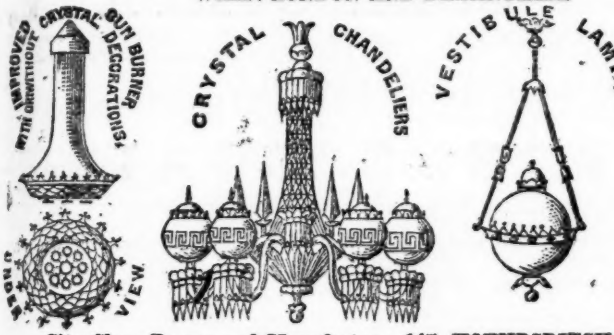
AND EVERY DESCRIPTION OF

GAS AND WATER FITTINGS.

THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.

STREET LAMPS AND COLUMNS IN GREAT VARIETY.

WORKS: LONDON AND BIRMINGHAM.



GAS MOONS,
Cut and Engraved, of the newest designs

GAS REFLECTORS
In Silver and Glass

GAS NIBS
AND
BURNERS
Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1876, are now complete.

City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.

ESTABLISHED 1830.

LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

SOLE AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

G. J. EVESON,

GAS COAL AND CANNEL FACTOR,

Has on offer, and for immediate delivery, in quantities to suit purchasers, Best Wigan Arley Mine, Orrell Screened and Unscreened Gas Coal and Nuts; Best Yorkshire, Real Old Silkstone, Derbyshire, and North Staffordshire Screened and Unscreened Gas Coal and Nuts; also Best Lancashire, Yorkshire, Derbyshire, and other Cannel, as supplied to some of the principal Gas Companies in England, to whom references are permitted.

Analysis and Prices forwarded on application to

HEAD OFFICES, STOURBRIDGE.

N.B.—Gas Managers will oblige by advising when they will be prepared to receive Tenders.

STOURBRIDGE FIRE-BRICKS, RETORTS, CLAY, &c.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or export Best Wigan Arley Gas Coal and Nuts; best qualities of the Derbyshire, Yorkshire, and North Staffordshire Gas Coals and Nuts; also the best descriptions of Lancashire, Welsh, Scotch, and other Cannel.

Messrs. WILSON CARTER & PEARSON, being contractors to several of the principal Gas Companies in the Midland Counties, have pleasure in being enabled to give them as references.

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THE DERBYSHIRE

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Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	**10,775**
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THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

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JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

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WIGAN & WHISTON COAL COMPANY,

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(COLLIERIES—PRESCOT, NEAR LIVERPOOL)

Are now prepared to supply their

RUSHY PARK GAS COAL,

Either to Gas-Works in England or Wales, or for Shipment, at Runcorn, Garston, Birkenhead, or Liverpool.

This Coal is of superior quality, and yields in practical working over 10,000 cubic feet of Purified Gas per ton, with an Illuminating Power of 17½ candles.

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SILKSTONE GAS COAL

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EMOR G. WRIGLEY, Merchant,

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PRICES AND ANALYSIS WILL BE FORWARDED TO ANY PART ON APPLICATION TO THE CHIEF OFFICE,
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WEST'S GAS IMPROVEMENT COMPANY,

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ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

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THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

Warrington Gaslight and Coke Company,
Offices, Mersey Street, Warrington, April 23, 1877.

Messrs. NEWTON, CHAMBERS, AND CO.,

Gentlemen,

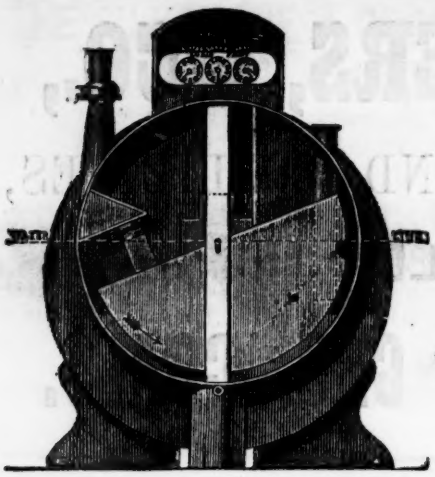
After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

The average of Nine samples gives a yield of 12,500 cubic feet of 15½ Candle Gas, being equivalent to 664 lbs. of sperm per ton, and 1420 lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

Yours truly,

JAMES PATERSON.

Full particulars will be sent on application to us—address as above.



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Over 120,000 in action.

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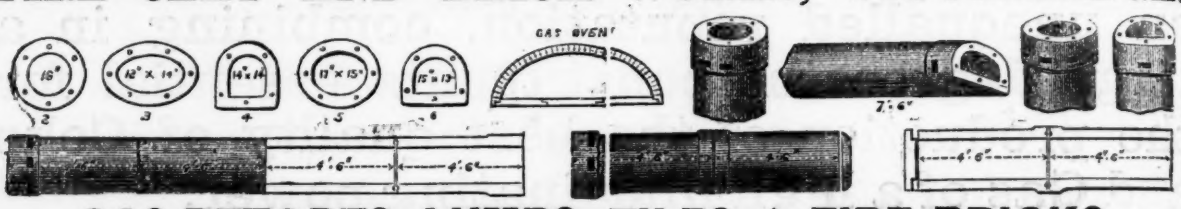

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OF EVERY DESCRIPTION.

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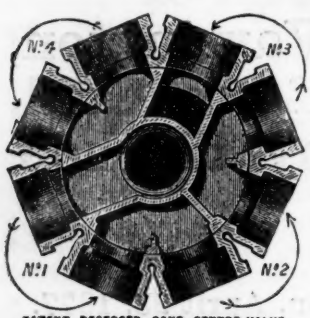
Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



PATENT RECESSED CONE CENTRE-VALVE.
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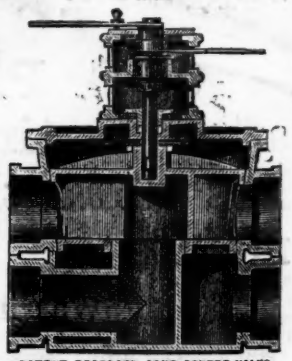

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PATENT STREET LAMPS,

Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

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By the use of which stoppages in service and other pipes are freed from naphthaline and other obstructions in a few minutes. PRICE 73s. net.

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